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TO OUR SUBSCRIBERS

EVERY INDUSTRY is confronted with rising costs of operation to-day. Publishers are no exception to this rule. Everything that enters into the production of a magazine costs more than it did a few years ago, and the end is not yet in sight. Paper has increased greatly in cost during the last two years and has been difficult to secure at any price, while a further advance of 30 per cent will become effective on January 1. Printing costs have risen and are increasing with each successive raise in wages of the employees. The cost of engravings has risen over 25 per cent in the last year. While it is probable that the unfair zone postal law will soon be repealed its substitute will constitute a very material increase over the old rates.

Up to this time we have absorbed these costs and have maintained the subscription price of the *Railway Maintenance Engineer* at the same figure of $1 per year, which was established when the paper was first issued. During the last year the subscribers have paid less than one-third of the mechanical cost of production of the publication alone. It has now become necessary for us to increase the price to $2 per year, effective January 1, 1919. Even at this rate the subscriber will pay only about one-half of the manufacturing cost of the paper. We make this statement in justice to our subscribers, with the belief that they will concur in the necessity for this action.

It shall be our endeavor to make the *Railway Maintenance Engineer* of constantly increasing value to railway men engaged in the maintenance of the tracks and structures during this critical period in the history of the American railroads. Among the subjects which are of special interest to maintenance of way men at the present time and to which we will gave particular attention during the coming year are the problems incident to the handling of labor during the reconstruction period; the taking up of the deferred maintenance preliminary to the return of the roads to their owners; the possibilities for the more general substitution of labor-saving equipment to offset the increased cost of labor and equipment and the promotion of more efficient practices in the routine as well as the more special work confronting the department. By this means it will be our aim to render the maximum assistance to our readers in the period of transition which we are now entering.

In Again, Out Again, Gone Again

On December 26, 1917, President Wilson issued his proclamation taking over the railroads and appointed William G. McAdoo director-general. On February 9, 1918, the organization of the director-general's staff was announced, including C. R. Gray as director of the Division of Transportation. On March 12 the Division of Capital Expenditures was created and R. S. Lovett was appointed director. On November 22 Mr. McAdoo announced his resignation. On December 5 Mr. Lovett resigned. On December 20 Mr. Gray's resignation was made public and it is understood that other resignations are pending. Thus within a year a large organization has been created, the purpose for which the roads were taken over (the winning of the war) has been accomplished and the

organization is now disintegrating rapidly. In view of the inability of the present able administration to make a showing favorable to the permanent retention of the roads under federal control it looks as if the government ownership advocates have a hard winter ahead.

THE PAINTING SITUATION

ONE BRANCH OF maintenance of way work which probably has suffered less from the labor shortage than any other is that of painting. This has been particularly true following the wage advance granted during the past season. Owing to the high prices of paint brought about through shortages of material, both through lack of shipping and the diversion of essential basic materials to war purposes, there was a great decrease in the amount of painting done throughout the country, particularly in house painting. The situation was affected also by the decrease in the amount of building work done because of restrictions placed by the War Industries Board.

As a result of this many house painters were thrown out of employment and while some of these sought other lines of work, the wage increase made the railroad painting sufficiently attractive for these men to seek employment with the roads. Now that the war is over and conditions leading to a scarcity of paint materials will largely be removed and building operations will be restored with increased vigor, these painters will again be afforded many opportunities for employment. Thus, while the end of the war will improve the labor situation in most lines, there is every indication that it will not do so in the case of painters. In view of this maintenance of way officers should make every effort, consistent with economy and efficiency, to increase the attractiveness of railroad employment for these men.

THE NEW YEAR?

ONE WOULD BE rash, indeed, to attempt to forecast the developments which the new year will bring forth. This is particularly true in the railway field, where the entire future policy of railway control and management is in such a state of uncertainty. Conditions are hardly less unsettled in the maintenance of way department. However, certain indications stand out and their proper interpretation will do much to prepare railway men so that they can take advantage of them.

Everyone conversant with the situation is agreed that a large amount of maintenance work must be undertaken next season. The starvation policy to which the roads have been subjected for the past three or four years and particularly during the year now closing cannot be continued longer without danger of a serious breakdown on many lines. Furthermore, as the government is under contract to make good the deficiences of 1918, and as this alone will include more work than can be completed during the coming year, a busy season may be anticipated and one which will at least bring the properties to a higher state of maintenance than they are at present.

In preparing the 1919 program the labor problem still holds the center of interest. The war is over and large numbers of men are being released from munition plants and other military service. The ability of the country to absorb these millions of men without a period of unemployment remains to be demonstrated. However, it appears to be the consensus of opinion that there will be little or no surplus labor and possibilities of even some shortage as industrial activities return to normal and the depletion of labor resulting from the four years' cessation of immigration becomes evident.

Regardless of the uncertainty relative to the surplus or shortage of labor one thing is assured—that wages will not come down to any marked extent, at least in the near future. This makes all the more necessary the substitution of mechanical for manual methods wherever possible and gives a different but equally strong argument for the development and promotion of labor-saving devices. Last year the problem was to get the necessary work done, in a measure regardless of cost, and labor-saving devices were utilized to increase production. This year the importance of economy again comes to the front and the argument for the introduction of mechanical equipment must be based on the ability of the device to replace a sufficient number of men to show a net decrease in cost.

The material situation should improve rapidly during the next season. Already the stringency in certain lines of supplies is rapidly disappearing. Restrictions are being very generally removed and the War Industries Board itself passes out of existence on January 1. The expectation of lower prices is conceded by manufacturers and purchasers alike. The only question concerns the extent of the break. Obviously materials cannot be forced back to pre-war figures hurriedly, as the manufacturers are confronted with greatly increased wage rates which they cannot reduce rapidly. The trend of the material market will without doubt be downward, but on a gradual rather than a hurried scale.

CULTIVATING LABOR

ONE OF THE marked developments of recent years has been the increased consideration given by employers to the working and living conditions of their employees. This has been promoted particularly during the war when increased output was so much desired. Now that hostilities have ceased and the immediate crisis has passed, labor is not going to drop back to its former position willingly. It has gained certain privileges which it is going to retain as long as possible. Progressive employers do not desire that their men should be forced back into their old working conditions; rather they see the dawn of a new era in the handling of labor problems in which the employee will have a greater voice in the conduct of industry and they are endeavoring to shape their methods so as to co-operate along constructive lines in order that both employee and employer may benefit.

As large employers of labor, the railways are vitally interested in this problem, which has consumed an increasingly large proportion of the time of the executives in recent years. Certain groups of railway employees have been highly organized and through this have been able to secure important concessions in wages and working conditions. Other employees, as in the maintenance of way department, have not been so organized for collective bargaining and as a result have not shared in its benefits. During the past year of federal control these men have been the recipients of large increases in wages. At the same time the organization of these employees into unions or brotherhoods has received a marked impetus.

It will be unfortunate if the railways fail to give their maintenance employees consideration commensurate with that accorded other branches of the service, while the power of initiative still remains in their hands, for concessions granted under pressure yield little benefit. Experience has shown that the increases in wages granted organized labor during the last year, as in the past, have usually resulted in a decrease rather than an increase in production. On the other hand, attention to the welfare of the men, taken on the initiative of the roads in ad-

vance of demands, has almost uniformly produced results.

Adequate compensation is a basic requirement for contented and efficient employees. It is not, however, the sole consideration. Proper living and working conditions do much to instill a spirit of loyalty and appreciation in the minds of employees and yield large returns. This is demonstrated by the experience of the Richmond, Fredericksburg & Potomac, described on another page of this issue. The maintenance officers on that road have given special attention to the welfare of their men and this has contributed in large measure to the unusual record which that road has been able to make in effecting a net reduction in maintenance of way expenditures of over $800 per mile of line in 1917 has compared with 1910 in the face of a heavy increase in traffic.

Among the measures of this nature which have been adopted on this road have been the provision of living quarters well above the average for foremen and laborers alike. Few roads have provided facilities of as high a grade for their men, but those roads which have done so have secured equally satisfactory results.

The establishment of an apprentice system by which an adequate supply of white foremen is available in a country which normally secures its track labor from negroes is of self-evident value. The granting of a vacation each year to foremen is a privilege commonly enjoyed by other monthly employees in less responsible positions which looms large in the eyes of maintenance foremen. These are typical of many measures which mean much to the employees and which yield large returns to the roads if properly bestowed and administered.

By giving this problem the attention which it deserves now and by granting to the men those privileges which employees in other departments have been able to force from the roads, the maintenance department can still secure many of the benefits it will lose if action is deferred. With the increased wage rate now paid, the roads are now able to compete for men with other industries on a more equitable basis and they have an opportunity to recruit a more efficient force than in the recent past. It is to be hoped that the maintenance of way department will profit by the experience of the last year, will save that which is good from the innovations which have been introduced and will proceed to place maintenance of way labor on a more permanent and efficient basis.

FAVORABLE WEATHER CONDITIONS

IN CONSIDERING the obstacles which interfered with maintenance work during 1918, it is interesting to note that nature alone was kind. The working season of 1918 was much longer than usual in most parts of this country, the weather was generally favorable and there was a singular absence of severe storms. It is true that the blizzards and periods of low temperature last winter occurred almost entirely within the calendar year of 1918, but coming as they did, during the mid-winter months, the effect of these storms was to interfere with railway operation rather than maintenance and the work of the maintenance of way department in connection with these storms was directed towards keeping the roads passable for traffic rather than to carry out any actual work on the tracks or structures.

An early spring permitted the inauguration of actual maintenance activities much earlier in the season than usual, while an extremely late fall has allowed the work to continue longer than is generally the case. Comparing the present season with that of a year ago this difference is particularly striking. The almost entire absence during the past year of heavy storms resulting in washouts and floods, has resulted in the saving of many thousands of dollars and the time of a great many men. Coupled with the adverse conditions actually presented in the conduct of the maintenance of way department during the past year, floods, a short working season and a large amount of unfavorable weather would have made track conditions far worse than is now actually the case.

A YEAR OF TRIAL

THE YEAR 1918 has been an eventful one for the entire civilized world. When considering what terrible tribulations, what desperate trials, what horrible consequences it has meant to many people, it seems somewhat beside the point to dwell upon the special difficulties which it has brought to bear upon the conduct of ordinary commercial and industrial activities at remote distances from the scenes of conflict. Nevertheless, as compared with conditions prevailing before this war and (as we all sincerely hope) for many years to come, the conditions obtaining during the past twelve months stand out in striking contrast. Thus, referring alone to conditions in the maintenance of way field of the railroads, never were tracks subjected to as heavy traffic, never was labor so scarce, so inefficient or so independent; never were all materials and supplies so hard to get and never, in recent years at least, were rail renewals so far in arrears. Conditions such as these placed responsibilities on the maintenance of way officer entirely out of proportion to his previous experiences. He was compelled to resort to expedients which would be considered poor practice in other years. He was compelled to devote more time and energy to his work than ever before and he was called upon for the exercise of the maximum possible ingenuity in working out the new problems presented to him.

It is true that to a certain extent the trend of developments in the maintenance of way field followed plans having their inception a year or two previous. For instance, improvements in the housing and feeding of labor received their great impetus during 1917 and the efforts for betterments in that direction during 1918 were but an elaboration or extension of the work of the year before. The same holds true of the extension of labor-saving facilities. The past twelve months were not marked by any sudden expansion in this line, but may be characterized rather for the extensive application of devices developed and demonstrated in previous years.

All through the year efforts were directed towards keeping the tracks and structures in a passable condition with the expenditure of the least amount of labor and the use of such material as was to be had. Labor conditions, thanks to the wage advances granted by the Government, tended to improve, if anything, towards the close of the year. With materials, conditions grew steadily worse, culminating early in the fall in a concerted movement, fathered by the Railroad Administration, for the utmost economy in the use of all materials—the accumulation of all scrap for the purpose of reclaiming all usable material as well as to afford the largest possible supply of old materials for re-manufacture. This campaign did not attain full sway in time to secure the largest possible benefit for the purpose intended, but it will unquestionably have a lasting benefit in instilling in the minds of men who use them, a sense of the intrinsic value of materials. Taken as a whole, 1918 was a severe test for all maintenance men, and all those who gave a good account of themselves during that trying period have demonstrated their worth and should have no difficulty in making creditable showings in the years to come.

LETTERS TO THE EDITOR

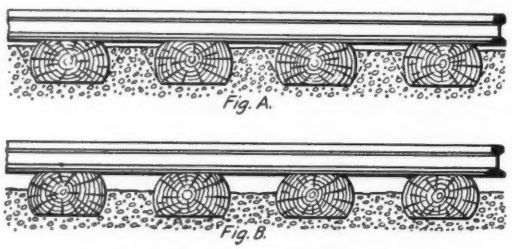
WHY TRACK BECOMES CENTER BOUND

Dilworth, Minn.

TO THE EDITOR:

The proposal to remedy center bound track by increasing the size of the ties and obtaining more bearing per panel of track, as suggested by a correspondent in the October issue of the *Railway Maintenance Engineer* does not seem to me to be the best solution of this problem. While the size of tie recommended is well within the limits of good practice and the length of 8 ft. 6 in. has been shown by at least one careful experiment to be the length wherein the pressure is the same at all points of the tie, yet, in the face of the decreasing timber supply, I think that we should first give attention to properly supporting the ties we now have in common use.

While local conditions in some cases may require special treatment, in most cases the real cause of center bound track, especially in gravel ballast, is a weak shoulder and a ballast cross section (standard in many places)



Two Methods of Dressing Ballast

which requires that ballast be dressed off to a point about three inches below the top of the tie. There is a constant tendency for section men to raise the track slightly when tamping and then borrow gravel from the shoulder to fill in. The result is that much track is raised without widening the shoulder, the ballast slope starts at the end of the tie and instead of being maintained an even three inches below the top of tie it is soon more nearly five inches below and runs down to the subgrade on about a 1 to 1 instead of a 2 to 1 slope as good practice requires. There is thus a tendency to get the track up on a narrow ridge with little support except for the section between the rails.

While good drainage is always a first consideration, yet this applies particularly to the subgrade and I think the idea of drawing down the ballast section to a point more than one inch below the top of the tie at the end is a mistake. Probably 75 per cent of all ties in use are of the pole type and with the slight up and down movement of such a tie under passing wheel loads, it tends to tamp itself by reason of the gravel pebbles which are continually rolling down the sides of the tie from the supply of material which should be present above the center of the rounded cheeks. With a full ballast shoulder as illustrated by "A," the supply is there ready to drop into place, but with the ballast cut down as illustrated by "B" and as is now so generally the rule, there is no material available to roll into the vacant space as the end of the tie lifts so the ends of the tie become looser with each train movement, and the track is soon center bound. With the sawn tie, the effect is not quite so marked and yet even in that case ample ballast at the end of the tie is a big help. Cutting down the ballast section below the top of the tie also means reducing the amount of gravel on the shoulder beyond the end of the tie, and even with a 2 to 1 slope there is far too little ballast remaining to hold the tie properly in line. Witness the frequency of sun kinks where this standard has been adopted; also the tendency on double-track lines for each track to settle at the outer edge of the embankment where there is not the same shoulder support as between tracks.

While we are considering the advisability of 12 to 24 in. of gravel under the ties, let us not forget that the amount of gravel on the shoulder has a most important function to perform and that if the track is allowed to become center bound, as there surely is a tendency with many of the standard ballast sections in use to-day, we may be even worse off in many cases than with too thin a layer of ballast underneath the tie. E. M. GRIME,

Supervisor, Northern Pacific.

NEW BOOKS

Directory of the American Association of Engineers. 6 in. by 9 in. 192 pages, bound in paper. Published by the American Association of Engineers, 29 South La Salle Street, Chicago. Price $2.

This publication is unique in that the alphabetical list of the members contained therein, not only gives the name, address and position of each member, but states briefly his experience, the particular branch of engineering in which he is engaged and the class of work which he has done. The object of this information is to give a prospective employer some idea of the qualifications of a candidate for the position he has in mind. This alphabetical list is amplified by a classified list in which the names of the members are grouped according to classes of engineering while being indexed under the particular character of position occupied. The book also contains an account of the activities of the association, constitution, by-laws, fiscal statement, etc.

Concrete Engineers' Handbook. By George A. Hool, associate professor of structural engineering, University of Wisconsin, and Nathan C. Johnson, consulting concrete engineer, New York. 885 pages, 6 in. by 9 in. Bound in flexible leather. Published by McGraw-Hill Book Co., Inc., 239 West Thirty-ninth street, New York. Price $5.

The book naturally divides itself into two sections for the respective use of the builder and the designer. The first portion includes a section on materials covering cement, aggregates, water and reinforcement; a section on general methods of construction covering the proportioning of the concrete, field tests, waterproofing, mixing, finishing, forms, etc. Another section covers the construction of concrete floors, walks and roadways. There is also a discussion of the properties of cement, mortar and concrete. In the second portion of this volume will be found a section on the properties of reinforced concrete, one on beams and slabs, another on columns, another on bending and direct stresses, while, with reference to the designing of specific structures, there are sections on moments in building frames, buildings, girder bridges, hydraulic structures, miscellaneous structures, etc. Separate sections are devoted to foundations, retaining walls, concrete floors and abutments for steel bridges. The subject of estimating is also treated under a separate head. Much of the information given has appeared in earlier text books written by Mr. Hool, but the manner of presenting it in this volume is clearly that of the handbook. In the portion devoted to the constructor there are illustrations of various proprietary reinforcements with tables of their properties, illustrations of construction equipment, etc.

PROMOTING EMPLOYEES' WELFARE BRINGS LARGE RETURNS

Broad Policy in Handling Men Effects Reduction in Maintenance of Way Expenditures in the Face of a Large Increase in the Traffic

Typical Section House Furnished to Foremen

BY CLOSE ATTENTION to the details of the work by the supervising officers and a well defined policy in the handling of the employees, involving comfortable living quarters and attractive surroundings for both the foremen and the men, and the provision of an incentive for the faithful performance of duty through a plan for the training and promoting of men from the ranks to the more responsible positions, the maintenance of way department of the Richmond, Fredericksburg & Potomac and the Washington Southern has been able to raise the standards of maintenance during the past few years and at the same time effect a yearly decrease in the expenditures per unit of work done, in the face of a great increase in the volume of traffic handled and advancing costs of both labor and materials. In accomplishing this end, interesting methods have been worked out, some of which are discussed in the following article:

Map of the R. F. & P.

For the purpose of this article reference will be made at times to the Richmond-Washington line, which is comprised of the Richmond, Fredericksburg & Potomac Railroad and the Washington Southern Railway. These roads have been combined for traffic purposes and are operated as a unit. Together they form a continuous double-track line between Richmond, Va., and Washington, D. C., and constitute the eastern traffic gateway between the south and the north and east. The combined line is approximately 112 miles in extent, of which 80 miles, from Richmond to Quantico, is owned and operated by the Richmond, Fredericksburg & Potomac and the remainder by the Washington Southern. The officers of one road serve in a like capacity on the other.

The traffic handled over this line is particularly heavy, consisting principally of high speed passenger service and time freight trains. The character of traffic handled is unusual in that the passenger train miles exceed the freight train miles and the revenue derived from the passenger traffic is greater than the freight revenue. During the year ending December 31, 1917, the Richmond, Fredericksburg & Potomac carried 1,125,221 passengers one mile per mile of road and the Washington Southern 1,367,646 passengers, or more than ten times the average handled by the roads of this country. In the same year the Richmond, Fredericksburg & Potomac carried 2,988,391 ton miles of revenue freight per mile of road and the Washington Southern 2,685,830 ton miles, or nearly three times the freight traffic of the average road. The total operating revenues of the Richmond, Fredericksburg & Potomac for 1917 were $59,870.06 per mile of road and $77,689.25 on the Washington Southern, or more than five times those of the average road in the United States.

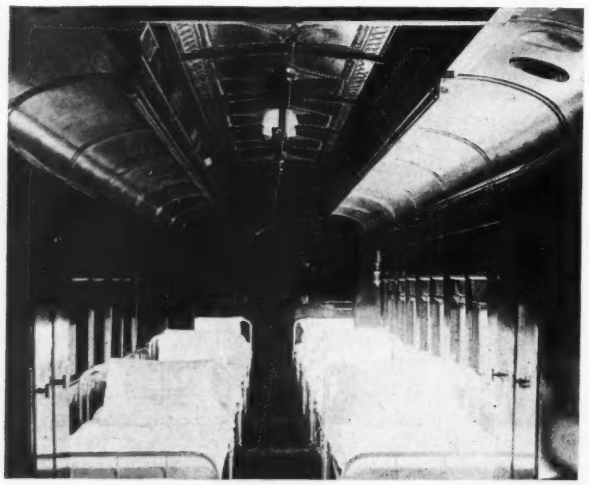
The volume of traffic handled is increasing at a remarkable rate. During the year ending December 31, 1917, the number of passengers carried one mile per mile of road on the Richmond, Fredericksburg & Potomac increased 83.07 per cent as compared with the previous year and the number of tons of freight carried one mile per mile of road 16.34 per cent. During this same period the Washington Southern showed an increase of over 100 per cent in passenger traffic and 14.83 per cent in freight traffic.

In spite of these increases in traffic handled the expenditures for maintenance of way and structures have shown a constant decrease in cost per revenue train mile and per mile of track. In the year ending June 20, 1910, the Richmond, Fredericksburg & Potomac expended $344,042 for maintenance of way and structures at a cost of $0.30 per revenue train mile and $1,563.83 per mile of track. In the year ending December 31, 1917, the expenditures were $250,403 at a cost of $0.16 per revenue

train mile and $1,032.16 per mile of track. A similar record has been made on the Washington Southern.

THE MAINTENANCE OF WAY ORGANIZATION

The maintenance of way department of the two roads is in charge of the engineer of maintenance of way, with office at the operating headquarters at Richmond. All engineering and construction work on the Richmond, Fredericksburg & Potomac is handled through this office under the direction of the resident engineer. The track work is handled by two supervisors of track, one for each road, the Washington Southern supervisor handling also the engineering and construction work on that road. The signal work for both roads is handled by a supervisor of signals and the work on structures by a general foreman of bridges and buildings. These men report solely to the engineer of maintenance of way. There is no separate department for water service. Plants are installed under the direction of the bridge and building forces except for the skilled work, which is let by contract or is done by the mechanical department, which is also responsible for repairs. Helpers and other em-



Cleanliness Is a Prime Requisite

ployees at the various plants report to the section masters, who are also responsible for supplies.

Each supervisor of track has an assistant and the supervisor on the Washington Southern has a small engineering corps. The track forces are allotted to the different sections on the basis of one man per mile of main track in favorable weather, or from April 1 to October 30, inclusive, and are reduced in the winter months. The sections vary in length from 3.5 to 5 miles of double track, the difference being due to the side track mileage.

Each supervisor of track has a work train assigned to his service every working day of the year and may secure others on authority of the engineer of maintenance of way. He is also allowed a permanent floating gang throughout the year.

The signal forces install all bonding and trunking and the installation and maintenance of all insulated joints and switches are also taken care of by these forces. The structures are repaired by the general foremen of bridges and buildings, who ha. a foreman of bridges and buildings for each road and a foreman of masonry and concrete.

As a means of raising the standards of maintenance an inspection of the main line tracks is made annually. The inspection party is accompanied by representatives of foreign roads. These representatives are either engineers or supervisors of maintenance and four of them act as judges. They are furnished with inspection blanks and under each of the 10 subdivisions, as shown in the sample form, they record the points to which, in their judgment, each section is entitled. In rating the sections for the prize awards the cost per mile for maintenance is considered and the prizes are given to the section mas-

RICHMOND, FREDERICKSBURG AND POTOMAC RAILROAD COMPANY

INSPECTION OF TRACKS

Date Nov. 14, 1916

Supervisor James Burke Inspector William Murphy

Section No.	SECTION FOREMAN	Ditches and Banks	Policing	Ballast	Buildings and Grounds	Line	Surface	Spacing Ties	Gaging	Joints and Bolts	Switches and Bridges	Rating
		10	5	5	5	20	25	5	10	5	10	Total
1	R.B.Black	8	4	2	4	18	22	4	8	4	4	83
2	W.H.Bryant	9	4	4	3	19	20	3	9	4½	8½	84

Typical Inspection Report Entries

ters who have obtained the highest number of points at the lowest cost.

The road offers four prizes: a first prize of $100 in cash, a second prize of $65, a third prize of $55 and a fourth prize of $45. In addition, an individual prize is given by the engineer of maintenance of way to the man receiving first prize. This is in the shape of a Maltese Cross. On the face is engraved "First Prize" and the year and on the reverse side the number of the section or subdivision and the section master's name.

TRAINING AND CARE OF MEN

The maintenance department has an interesting and well formulated method of recruiting and training trackmen, carpenters and other employees. The recruits are

Interior of the Mess Car

hired as boys and trained in the service for promotion from one grade to another. For example, the chief source of common labor along this line is the negro, but in making up the section gangs efforts are made to employ one white man in each gang. In many cases a member of a section master's family is employed. These men receive special training to fit them for section master's positions and are paid 5 cents per hour more than the laborers. When competent they are used as floating section masters during the vacations of the regular section masters

(who are allowed 10 days' leave with pay each year) and during the absence of the regular men for any reason whatever.

During such service these men in training receive section master's wages and when a vacancy occurs the appointment is made from the ranks of these men, seniority, where ability and merit are equal, controlling the appointment. As a result of this practice all the section masters on the line, with one exception, are natives and they are all particularly high grade. This idea of securing young men and training them in the service has also been carried out in other branches of the maintenance department with the same excellent results.

Hardly less important than the training of the men is the provision by the company for comfortable living quarters and attractive surroundings for the foremen and men. One of the photographs shows a typical home for section masters. As may be seen, the house is particularly attractive and ample space has been provided for a lawn and flowers as well as for a garden. Adjoining the section master's house are the bunk houses for laborers, which are comfortable in all respects. These are two-room shanties, fitted by the company with steel bunks, mattresses, a stove and utensils. The men furnish the blankets.

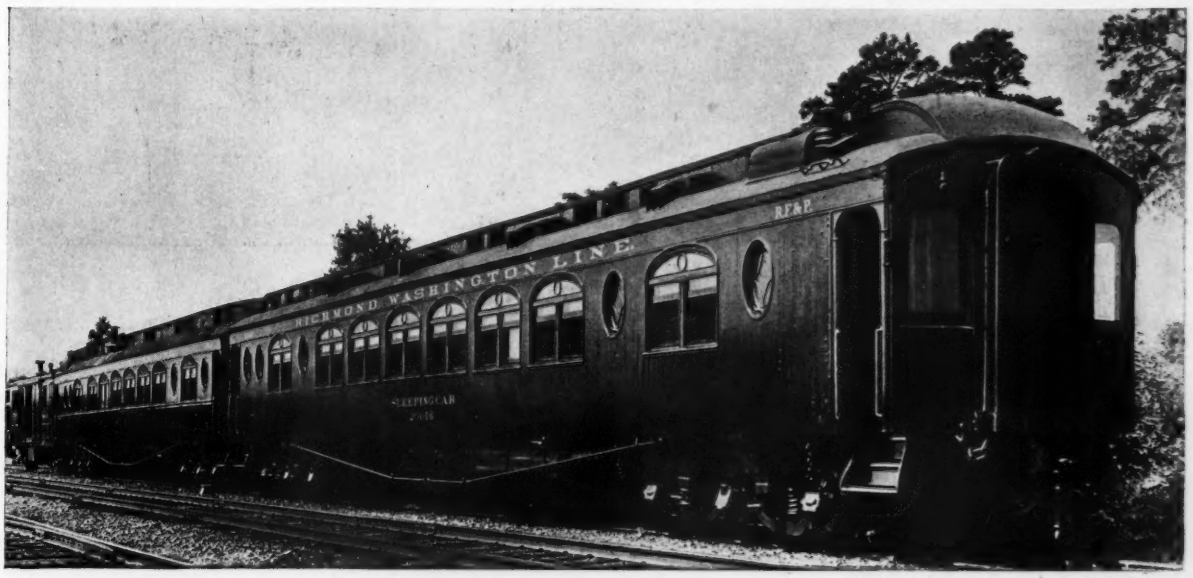
The welfare of the laborers is further advanced by allotting them garden spaces along the right of way, or, in the event of laborers owning an acre or two of land, by encouraging them to farm, allowing them time off when planting or harvesting and for the cultivation of the crop. The section masters are allowed and urged to run commissaries and to loan the laborers small amounts of money when necessary to save them from loan sharks.

The photographs show the equipment furnished for floating gangs. As may be seen, the train consists of a box car converted into a tool car, and two converted Pullman sleepers, one for dining and one for sleeping quarters. The dining car is divided into two sections, the kitchen and dining room. The interior view of the car gives an excellent idea of its attractiveness and of the equipment which is furnished by the company, both in the kitchen and the dining car. In the sleeping car the old berths have been removed and beds installed. Steel lockers for the personal property of the men are also provided. The section originally assigned to the smoking room has been converted into an office and sleeping compartment for the foreman.

STANDARDS AND METHODS

The main line tracks on these roads are laid with 100-lb. rails without tie plates except on curves of 1 deg. or more. Untreated ties are used exclusively, consisting chiefly of white oak with some post oak, chestnut, locust and walnut, all ties being 8 ft. 6 in. in length. Grade 1 sawed ties are 7 in. thick with an 8-in. face and the hewed ties of the same grade are 7 in. by 7 in.

The ties for renewal and other purposes are distributed along the line during the winter months by work trains and the floating gang, working under the direction of the section masters, who are responsible for the renewals. Before the distribution begins all ties to come out of track are marked by the section master, and through his familiarity with conditions, he is enabled to so direct the unloading that a minimum of effort is required to get the ties in the track.



The Equipment Used for Floating Gangs

The renewing of ties is done if possible between the months of March and August in order that ample time may be had by the section forces to place the track in proper shape for winter. In common with many other roads it has been the policy on this line to pile and burn the old ties released from track. During the unusually cold weather of last winter, however, the old ties were put to useful purposes, the engineer maintenance of way securing authority from the management to load them on the work trains and deliver them at the larger towns along the line for distribution among the poor.

A considerable portion of the ties used are purchased locally. These ties are delivered along the line and are stacked at suitable and convenient points on the right of way on ground as high or higher than the grade of the railroad, in accordance with positive instructions as to the method of piling and are held subject to the inspection of the supervisors of track or their assistants.

The rail is laid during the summer or fall months by the floating gang and consolidated section forces, and is placed in track with the aid of rail-laying machines.

In addition to the rail layer, the labor-saving devices in use by the maintenance department include two Mahoney ditchers. The equipment of these machines is put to double service by transferring the stationary engines to flat cars rigged with derricks for loading materials. Another device which is used with important economies in terminal districts is a motor car equipped with a trailer for hauling material, often doing away with the necessity of calling out a work train in addition to the one regularly assigned to the division.

Washed gravel is used exclusively for ballast on these lines, the gravel being secured from a pit located at Massoponax, Va., 57 miles north of Richmond, and midway between that point and Washington, a location which is convenient to the distribution of the gravel over the line. It is screened and washed at a company-owned and operated plant located at the same point.

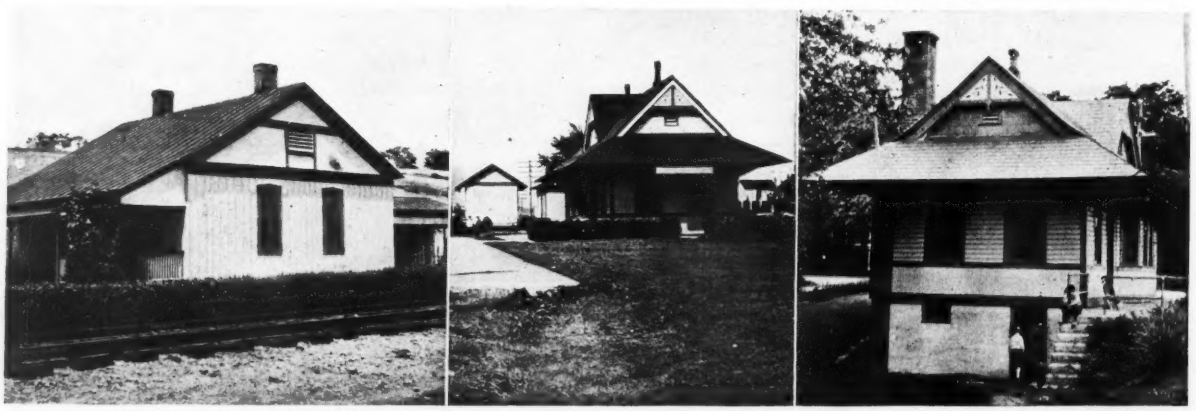
In the maintenance operations the general track repairs are made by the section forces, while the distribution of materials, new construction and ditching, except machine ditching, are done by the floating gangs. The section forces build small sidings, bunching two or more gangs for the purpose. Drop-bottom ballast cars are used for delivering ballast to the tracks and a ballast plow is provided for leveling it down. Track raising is done by the floating gangs which, at the same time, renew and space ties ahead of the new ballast and regage the track. With sufficient labor it is the custom to renew all ties out of face. At present they are spotted in and in this connection it is of interest to note that spades are utilized for the tamping, a custom that was originated on this road and one from which very satisfactory results are obtained, both in the cost of the work and rapidity of doing it.

While a permanent wrecking force, consisting of a wreck master, craneman, two car inspectors and a machinist, is employed, the track forces are used for the general work. In all wrecks where the main line is fouled the supervisor or his assistant attends.

Supply houses for roadway material are provided at terminals. The materials are shipped out to the sections at regular intervals in supply cars, the trips being made every second Wednesday by way freight. The road department loads a car with its material on Tuesday and delivers it to the mechanical department which adds its materials, shipping the car on Wednesday with a man in charge. Materials needing repairs are collected on these trips, all repairs being made by the mechanical department and the supplies delivered to the supply houses, where they again become subject to requisitions.

The maintenance of structures is under the direction of the general foreman of bridges and buildings. To handle this work floating gangs housed in the equipment described above are moved from place to place as desired. As much concrete and other light construction work as possible is handled by these forces and the larger work is let by contract.

An interesting method has been worked out to care for the small repairs handled by the bridge and buildings forces. A walking inspector passes over the line once each month, inspecting all roadway structures. As he goes he makes such small repairs as are practical, reporting other things found wrong to the general foreman of carpenters, who maintains two general utility men at Fredericksburg, midway between the terminals, one to travel each way to make the small repairs. By this arrangement both men are enabled to get home each night.



Examples of Station Buildings Along the R. F. & P.

With the exception of the station buildings in the larger towns, all stations, when renewal becomes necessary, are built after plans developed by the engineer of maintenance of way. The stations embody all modern conveniences, such as toilets and heating plants, and are of attractive design. Concrete construction has been made standard for highway bridges, and the old wooden highway bridges are replaced with structures of this character as fast as they require renewal.

B. & B. COMMITTEE APPOINTMENTS

THE American Railway Bridge and Building Association has selected the following subjects for investigation during the coming year:

Methods and Equipment Used in Renewing Timber Bridges, Maro Johnson, assistant engineer, Illinois Central, Chicago, chairman.

Inspection and Repair of Roofs, George E. Boyd, division engineer, Delaware, Lackawanna & Western, Buffalo, chairman.

Methods of Bridge Inspection Under Present Conditions, Arthur Ridgway, assistant chief engineer, Denver & Rio Grande, Denver, chairman.

Economical Use and Storage of Fuel at Railway Pumping Stations, F. M. Case, foreman, Chicago & North Western, Belle Plaine, Ia., chairman.

Painting Metal Railroad Structures, Charles Ettinger, general painter foreman, Illinois Central, Chicago, chairman.

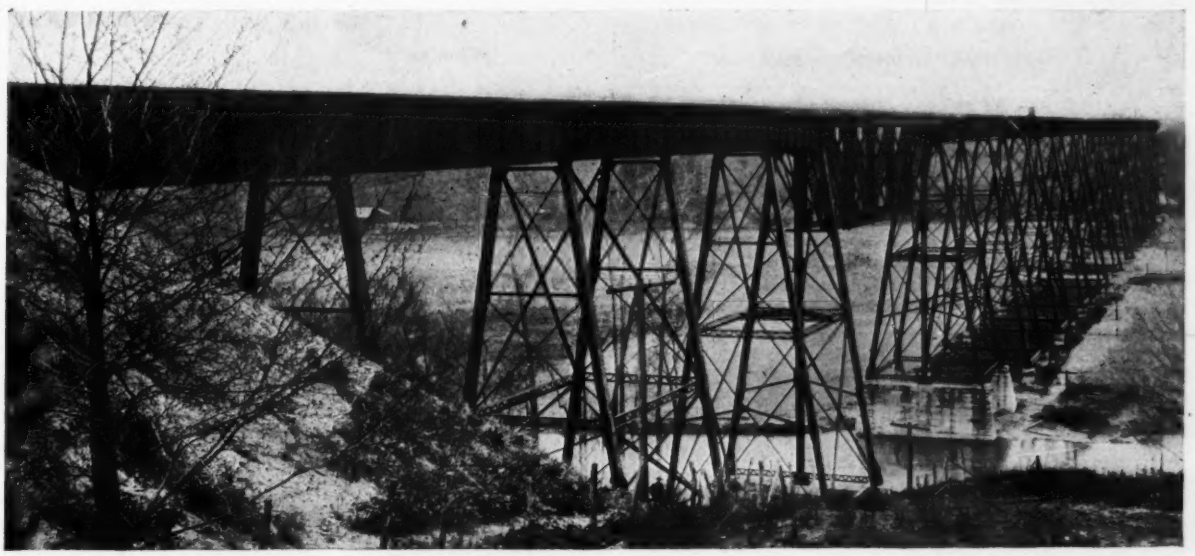
Tools, W. L. Derr, superintendent, Chicago Great Western, Clarion, Ia., chairman.

Railway Fire Protection Equipment, C. R. Knowles, Illinois Central, Chicago, chairman.

STRENGTHENING A LONG STEEL VIADUCT

Chicago & Eastern Illinois Retains an Old Structure in Service by Extensive Reinforcing

AN INDICATION of the measures which may be adopted to extend the life of a structure by increasing its load-carrying capacity is illustrated by the measures taken on the Chicago & Eastern Illinois to reinforce a long steel viaduct so as to permit of its use by locomotives of considerably greater weight than those which had been permitted on the structure before. This road had purchased seven Santa Fe type engines weighing 377,300 lb. and 25 Mikado locomotives weighing 300,000 lb., which were prevented from operating over the district on which this viaduct was located, thereby introducing a serious obstacle in the efficient operation of that portion of the line. The structure crosses the Kaskaskia river at Shelbyville, Ill., on the line extending south from the Chicago-St. Louis line at Findlay, Ill., into the southern part of the state. Another structure known as the Okaw river bridge, located on the main line about 3 miles from Findlay, Ill., introduced a similar obstacle.



The Kaskaskia River Viaduct After Being Strengthened

The Okaw river structure was a wrought-iron viaduct and the one over the Kaskaskia river was a steel viaduct. Each was 1,400 ft. in length, the former being built in 1892 and the latter in 1896. After a study of the situation it was concluded to replace the main line bridge by a concrete arch structure. In the case of the bridge at Shelbyville, on the other hand, it was deemed inadvisable to resort to renewal at this time, in view of the fact that it was found possible to introduce reinforcing that would bring the capacity of the structure up to an equivalent of Cooper's E-55 loading.

This viaduct consists of 14 towers and two rocker bents of varying heights, carrying 35-ft. tower spans, 15 clear spans of 50 ft.., and one clear span of 35 ft., in addition to a 125-ft. deck truss span over the channel of the river. The bridge was designed for a loading equivalent to Cooper's E-35 or E-40. The condition of the structure was good except that the cast pedestals under the columns were of a faulty design and had developed cracks in a great many cases.

The reinforcing included the addition of a center girder in all of the girder spans, as well as a center truss in the truss span, reinforcement of the columns of all bents and the addition of new center columns in the bents carrying the truss span. The erection of the new center girders, with the exception of those in the towers adjoining the truss span, was deferred until girders could be released from the old viaduct at Okaw river following the completion of the new structure at that point. All of the other work was started last fall and completed in the spring of this year.

The old columns were of the Z-bar and plate section, consisting of four 5-in. by 3-in. Z-bars riveted to a 12-in. plate. These were reinforced by riveting cover plates to the outstanding legs of the Z-bars on both sides of the columns and by increasing the strength and area of the column bases by means of plates and angles. This is shown in one of the photographs.

The reinforcing plates for the columns were punched in the shop, but for every shop hole in the plate there was a corresponding hole to be drilled in the field, or about 36,000 15/16-in. diameter holes in all. The plates were clamped into position against the columns so that they could be used as templates for punching the holes in the flanges of the Z-bars with a screw-operated punch worked by hand. Air-operated riveters were used for all of the riveting, and air-operated drills might have been used to advantage for the field holes, but for the lack of high-speed steel for drills. Two men working with each punch could make about 300 holes per day. Only a small gang, averaging about 12 men, was employed on this work, and as the drilling was the slowest operation on the work practically the entire crew was employed on the

punching until this had been completed on about 12 of the columns, when all the bolts available for temporary connections were used. The riveting was done with a pneumatic hammer supplied with air by a pipe line carried across the entire bridge. The reinforcing plates on the columns were milled for direct bearing at all splices. Old splice plates were removed and replaced on top of the reinforcing plates.

The assembling of the base reinforcement was a more complicated operation. Because of the presence of anchor bolts and bottom struts the new material had to

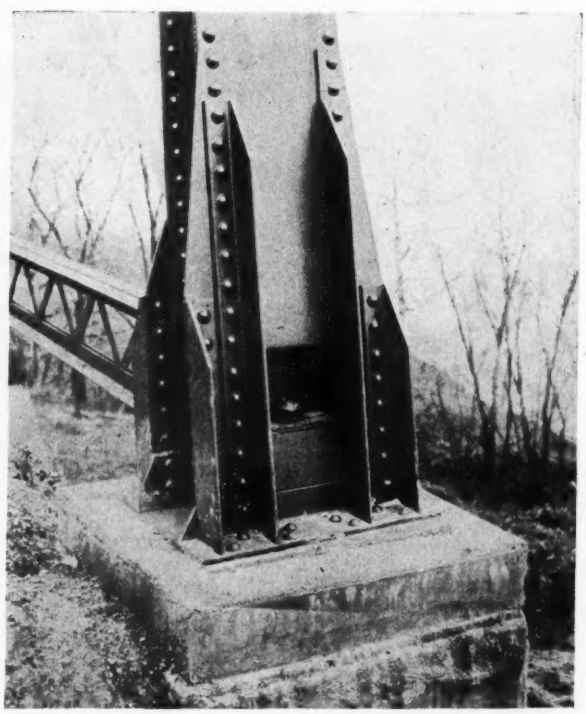
The Channel Span, Showing a Portion of the Center Truss

be applied almost piecemeal. The sole plate was inserted between the base of the column and the bearing casting by jacking up the column and sliding it underneath, this plate being slotted to clear the single anchor bolt. This new column base has a considerably larger area than the old casting on which it rests, and this additional area was made of use in carrying the load by putting a new reinforced concrete cap on the masonry pedestal to enclose the old casting and come up even with the top of the new sole plate.

The introduction of the center truss and new center girders in the adjoining panels was a more complicated job because the regular train movements interfered more seriously with the work. The new truss is a riveted span of the same depth as the old ones, which are pin connected. The distribution of the load to the new truss is obtained by the use of heavy cross frames, the connections of which were not riveted until the new girder was swung. The new steel was supported from the old by means of timbers bolted to the bottom chords of the old trusses and was placed by a derrick car from the deck, removing enough ties temporarily to clear the members being handled. The work was begun at one end of the span and, in general, proceeded in the regular order, putting in a section of the bottom chord first, followed by two web members and finishing with a section of the top chord. The time occupied in one of these operations, including the removal and the restoring of the deck, was about five hours. By co-operation with the despatcher this much time was made available without serious delays to trains; in fact, the longest delay to any train during the work was 20 minutes. The portion of the repair work on the structure described above was in progress from September, 1917, to March, 1918. The erection of the truss and the two adjoining girders occupied about two months.

Following the completion of the Okaw river bridge, the old viaduct was removed and work started on the reuse of the old girders of this structure as center girders and cross-girders in the viaduct at Shelbyville. The girders available were 60 ft. long and 5 ft. deep, while they were re-used in spans of 35 ft. and 50 ft. between side girders having a depth of 6 ft. Accordingly the second-hand girders were cut to the required lengths, the portions remaining being used to make cross-girders, which serve to carry the end reactions of the center girders to the side girders. The center girders frame into the webs of the cross girders and the latter frame into the webs of the side girders as close as practicable to their bearings on the columns.

Owing to the fact that the new girders are shallower than the old ones, the introduction of the former did not interfere with the top laterals. The ties are supported on the center girders by means of timber shims placed on their top flanges. There was no bottom lateral system, so the new iron could be placed readily from underneath by a derrick car standing on the track. The new steel re-



The Reinforced Column Base

quired for this work consists only of new cross frames, connection angles, etc.

All of this reinforcement was designed and installed under the direction of J. E. Bernhardt, bridge engineer of the Chicago & Eastern Illinois, and under the general direction of L. C. Hartley, chief engineer. J. A. Dunn was the resident engineer. The Strobel Steel Construction Company of Chicago had the contract for the first division of the work, and the Kelly-Atkinson Construction Company, Chicago, for the second part, involving the use of the old girders from the Okaw river bridge.

WHAT FEDERAL CONTROL HAS DONE FOR LABOR*

A Resume of the Measures Taken to Improve Relations Between the Managements and the Employees

BY W. S. CARTER
Director of the Division of Labor, United States Railroad Administration

TO STATE at this time what has been the effect upon labor of federal control of the railroads will necessitate an explanation of what has been done in so short a time. Having regard for the fact that approximately two millions of employees are affected, and much that has been done, if not experimental, has at least been in the nature of pioneering, I am convinced that a continuance of the sympathetic policy of the director general of the railroads will in the not distant future eliminate that feeling of unrest, if not desperation, so pronounced at the termination of private control.

An effect of federal control of the railroads upon labor has been the demonstration to them that there are orderly means by which all differences of opinion between employees and the railroads may be equitably adjusted. Almost immediately after the creation of the Division of Labor of the Railroad Administration this work was systematically undertaken; in fact, it may be said that the principal purpose of the creation of this division was to bring about a kindlier relation between official and employee.

BOARDS OF ADJUSTMENT CREATED

As a part of the great harmonizing plan of the present director general, three Railway Boards of Adjustment have been created, to which nearly all employees working under agreements with their respective railroads may appeal with certainty that a just decision will be reached. And for all employees not working under such wage agreements the Division of Labor of the Railroad Administration is a court of resort where justice will be secured.

All members of these Boards of Adjustment are technical experts in matters of wage bargaining and adjustments of the many other controversies that constantly arise between the railroads and their employees. They approach all matters submitted for adjustment with a thorough knowledge of detail and past practices. None of them can be convinced by the specious arguments that have so often led astray most estimable gentlemen who have served as neutral arbitrators.

For that great number of employees who had never been permitted to participate in wage bargaining and grievance adjustment through the machinery of labor union committees the Division of Labor of the Railroad Administration directly acts as adjuster of controversies. An assistant director, with high reputation and years of experience in the work of mediation and labor adjustments, has been assigned the especial duty of investigating and adjusting matters of controversy not coming within the jurisdiction of Boards of Adjustment. He is assisted by men of like reputation and experience in field work, known as representatives of the division of labor.

This theory, however, if time will permit it to be carried to its logical conclusion, will place all railroad employees within the scope of work of Boards of Adjustment, upon which each class will have a representative.

Time will develop in all probability that one of the most pronounced effects upon railway labor of federal control will be the standardization of wages and working conditions of railway employees. A purpose long asserted by organizations of such employees had been accomplished only to a limited extent, both as to classes and to territory, under the pre-existing conditions.

It has not been so many years ago that on some of our most important railway systems a policy prevailed that produced a different wage, if not a different condition of employment, on the several divisions of the same railroad. In some instances these differentials were established to meet the requests of the employees themselves, but in such cases a closer study will probably demonstrate that it was the inability of employees to secure a higher standard wage rate on all parts of a system that led them to press the claims of certain portions of the railroad where, because of peculiarly objectionable conditions, they had more convincing arguments to present for increased wages.

With the unification of the railroads under federal control the argument was immediately advanced by many employees, "Now that all railway employees are working for the government, all employees should be paid the same wages for the same work." But there had arisen another condition since the beginning of the great war that led employees to contribute to the defeat of their desire for standardization. Cost of living had advanced with such gigantic strides that many employees subordinated their altruism to their individual interests. Upon each man fell the burden of this depreciation in purchasing power of his individual earnings, and because of this burden he has, for the moment, subordinated his long-expressed desire for standardization of wages for his entire class to his desire to maintain his past individual standard of living. Notwithstanding this individualistic demand the direct result of the great increased cost of living, certain classes of railway employees have remained true to their desire for standardization.

General Order No. 27, issued on May 25, 1918, was the result of the recommendations of the first wage commission created by the director general of the railroads early in the present year. Increased cost of living since December, 1915, was the basis of computation adopted by that commission. To this was applied the humanitarian theory that the increased cost of living had fallen heaviest on the low paid employee. But regardless of the amount of increase in wages produced by General Order No. 27, hundreds of thousands of employees earnestly protested against the application of the order, because it "re-established the differentials" in wages prevailing in December, 1915, many of which differentials had been eliminated by wage negotiations during the years 1916 and 1917. This protest came largely from the approximately 350,000 employees engaged in the skilled shop trades.

The underlying theory of the wage advance of the first wage commission, while intensely humanitarian, completely undid all that had been done by shopmen, clerks, telegraphers, and others, toward standardization during the two years intervening between December, 1915, and January, 1918. Perhaps it will be of interest to know

*Abstracted from an address delivered before the thirty-eighth annual convention of the Academy of Political Science, held at the Astor hotel, New York City, December 7, 1918.

how General Order No. 27 produced this result. The first wage commission having based its recommended increases on the rates existing in December, 1915, recommended that any increases placed in effect subsequent to January 1, 1916, should be considered as a part of the wage increase granted through its recommendation. Thus, where in December, 1915, two like employees had been paid $3.00 and $3.50, respectively, per day, and the lower paid man had secured an increase of 50 cents per day in 1917, thus establishing a standard rate of $3.50 per day, General Order No. 27 increased the wage of the one who had earned $3.50 in December, 1915, to $4.77, while the employee who had earned $3.00 per day in December, 1915, was increased to $4.23 per day, and of this increase of $1.23 per day, 50 cents was deducted because of the wage increase of 50 cents per day in 1917.

The sympathetic attitude of the director general for the desire of railroad employees for standardization was amply evinced in that portion of his General Order No. 27, wherein he created a second wage commission, which he has designated as the Board of Railroad Wages and Working Conditions. In his supplements to the original General Order No. 27 this great work of standardization has been rapidly accomplished. Supplement No. 4 (July 25, 1918) established a minimum standardized wage, hours of employment and rates of overtime for approximately 350,000 employees engaged in the shop trades. Supplement No. 7 (September 1, 1918) and Supplement No. 8 (September 1, 1918) accomplished a like purpose for perhaps a million employees engaged in clerical and other station work, maintenance of way, common labor, etc. Supplement No. 10 (November 16, 1918) standardized minimum wages, hours of employment and rates of overtime for nearly 62,000 telegraphers, telephone operators (except switch operators), agent telegraphers, agent telephoners, towermen, levermen, etc., and a few days later Supplement No. 11 accomplished the same purpose for all station agents not performing telegraphic service. In creating a "minimum standard," rates that were higher are preserved.

Of course, in the pioneering work apparent discriminations, if not injustice to individuals, developed, and to remedy these the director general has directed the Board of Railroad Wages and Working Conditions to make further investigations in order that all may know that they will have a "square deal."

WAGES INTENDED TO BE PERMANENT

The one thing that has, to some extent, defeated the purpose of such an admirable policy has been the abnormal increase in wages of temporary war industries. Just why the railroads, under federal control, should not pay 80 cents per hour when this rate is paid by other governmental agencies is difficult to explain. But when it is realized, as it will be, that the director general's plan has been to establish wage rates that will be permanent, beyond the war period, and after the cost of living has decreased, railway employees will not complain. I am sure that had the director general remained with us it would have been his purpose to have maintained the rates of wages and working conditions established by him. It has been to accomplish this that he has refused to compete in wage increases with other agencies and industries whose activities will be greatly affected by a return of peace.

Another administrative measure, equally as important to railway employees as those mentioned in the foregoing, has been the recognition of the eight-hour day by the director general. In some instances he has not yet been able to grant higher rates of overtime after the eighth hour of work, but usually in such cases it can be shown that the other benefits of the wage order have been a great advance, and even in these cases the eight-hour day has been established with pro rata overtime for work performed in the ninth and tenth hour, and time and one-half for any work performed after the tenth hour in any day's work. Where past practices have resulted in an eight-hour day and time and one-half for overtime for large numbers of employees in any class, this practice has been extended to all employees in that class.

As early as February 21, 1918, less than 60 days after the railroads passed under federal control, General Order No. 8 was issued, which contained the following provisions:

> "No discrimination will be made in the employment, retention, or conditions of employment of employees because of membership or nonmembership in labor organizations."

This privilege thus granted, the principle of wage bargaining having been recognized, and existing wage agreements confirmed by the director general, thus placed all employees on roads under federal control on an equality with employees on most of the roads where a more liberal policy has heretofore prevailed.

The fact that the Division of Labor was created with the director of that division on full equality with directors of other divisions indicates the general attitude of the director general. It may be said that for the first time "labor" is recognized on equality in solving the problems of railroad administration.

No doubt there has been impatience among railroad employees because of delays in adjustments of matters affecting their well being, but it should be remembered that all that has been accomplished has been the result of the first 11 months of federal control. Having regard for the fact that approximately 2,000,000 employees have been involved; that varying conditions existed on many railroads, and that it must take time to solve such problems, I feel sure progress has been made with unusual rapidity in the settlement of most questions.

Under the existing congressional act, the railroads will pass back to private control on or before 21 months after the declaration of peace. Under private control, as under federal control, the labor problems are of great importance, and should have the serious consideration of those who are to reassume control. If Congress decides to enact additional legislation affecting the railroads, I sincerely hope that the rights and aspirations of labor in the operation of the railroads will receive due consideration. What has been done under federal control may serve as an illustration of what may be done under any form of control.

VALUATION PROGRESS

THE ANNUAL REPORT of the Interstate Commerce Commission for the year ending October 31, which was made public on December 5, devoted considerable space to the progress of the federal valuation forces. In this report it is stated that from October 1, 1917, to September 30, 1918, road and track parties covered 53,244.56 miles of main line and 81,469.73 miles of tracks, which was in excess of any previous year. Some districts will finish slightly in advance of others, but it is still believed that the engineering field work can be substantially accomplished by January 1, 1920.

Our last report stated that the office work of the engineering section should be finished during 1920, but that statement must be somewhat modified. For some reason it has been more difficult to maintain the integrity of that force, it having several times happened that more

than 25 per cent of the office employees in a given district have changed during a single month. It is impossible to predict just what the effect of this will be, but unless conditions become worse, not much additional time will be required.

The land section cannot produce completed reports until certain information is received from the carriers as to their lands; and inability to obtain this has limited the progress of this section. At the present time carriers are doing fairly well in this respect and it is expected that this section will complete its work within the year 1920.

The greatest difficulty has been experienced in obtaining and retaining competent accountants. The needed information can be readily collected from the books of the carriers, but it is difficult to find men who are competent to put this into the form of a completed report. The field work of this section will be finished in the first half of 1920, but there may be some delay in the preparation of final reports.

Attention is again called to the fact that, owing to the failure of carriers to furnish necessary information as to their equipment, and especially as to their lands, it is found necessary to stop work upon particular properties and proceed with other properties. To-day the work of the bureau in all branches is well advanced upon every considerable road in the country and is approaching completion upon many of the most important, but reports have been delayed by the lack of this information.

On the whole, it is believed that while the war has seriously affected this work it will not greatly postpone the period of final completion nor increase the total expense.

What Is to Become of the Railroads?

THE ONE GREAT QUESTION in the minds of all railroad men to-day, and the one which is also foremost in the thoughts of all serious-minded citizens, is the ultimate disposition of the railroads. A multitude of different ideas have been brought forth and an interesting feature of these expressions is the unexpected position taken by some interests, bringing about an alinement of opinions that is most unusual. Thus we find some bankers siding with the most radical politicians in favor of government ownership, while most corporate railroad officers are aligned with the members of the state railway commissions in opposition to that plan.

President Wilson proposed an early solution of the railroad problem in his address to Congress just previous to sailing for Europe. However, he did not commit himself as to the plan to be pursued, but mentioned three possible solutions, a complete return to private management, absolute government ownership, or "an intermediate course of modified private control." As emphasizing the need of an early settlement the following quotation is taken from the President's address:

"Let me say at once that I have no answer ready. The only thing that is perfectly clear to me is that it is not fair either to the public or to the owners of the railroads to leave the question unanswered and that it will presently become my duty to relinquish control of the roads, even before the expiration of the statutory period, unless there should appear some clear prospect in the meantime of a legislative solution. Their release would at least produce one element of a solution, namely, certainty and a quick stimulation of private initiative."

This is in direct opposition to the plan of Mr. McAdoo, who, following his resignation, proposed the enactment by Congress of legislation providing for the extension of federal control of the railroads for five years, or until January 1, 1924. Mr. McAdoo based his recommendation on the ground that it is impracticable, as well as opposed to the public interest, to attempt to operate the railroads under the provisions of the present law and that it will be impossible to secure legislation during the present session of Congress providing a permanent solution of the railroad problem. He declared that he is not interested in proving or disproving the theory of government ownership or any other kind of theory, but he hoped that Congress would make possible a test of unified railroad operation under proper provisions of law which will make the test effective and at the same time "take the railroad question out of politics" while the test is being made. Unless this is done, he said, the roads should be returned at the earliest possible moment. He added that "the President has given me permission to say that this conclusion accords with his own view of the matter."

J. J. Mitchell, president of the Illinois Trust & Savings Bank at Chicago, issued a statement late in November advocating government ownership, but on December 3 he modified his attitude with a recommendation for the operation of the railroads through an organization similar to that of the federal reserve banking system. In other words, the roads would be operated by a board of control with headquarters at Washington and a system of regional directors much as at present.

Representatives of the member roads of the Railway Executive Advisory Committee, at a meeting held in New York on December 4, adopted a number of resolutions stating their position with respect to the disposition of the railroads. The first three of these resolutions are presented in full below:

"1. That private initiative, enterprise and responsibility in the creation, extension, improvement and operation of the American railways should, as a matter of national policy, be fostered and preserved, and that government ownership and operation of these facilities is not conducive to the highest economic efficiency of the country.

"2. That the principle of reasonable, responsible and adequate governmental regulation of these facilities is recognized and accepted, but such regulation should provide for encouragement, protection and upbuilding of the railways as well as for the correction and check of any abuses.

"3. That in view of the termination of the war emergency, which caused the taking over of the railroads and their operation by the federal government, the remaining period of federal control should be characterized by a policy of restoration of the integrity of individual properties and of preparation for their return to their respective owners in the highest possible state of efficiency to serve the country."

There has been a great deal of discussion of this subject by various members of Congress and representatives of the political parties.

The Republican Publicity Association, through its president, Jonathan Bourne, Jr., has issued a statement opposing government ownership of railroads, in part as follows:

"The question of government ownership is not one to be decided according to the demands of temporary emergency. It is doubtful whether there was any real need for the Government to take over the railroads when it did. If the railroads had been granted even a portion of the increase in rates which Mr. McAdoo established soon after he got control, the private managers could have conducted the roads with as good service as the public could expect."

Luther M. Walter, formerly assistant to the director of public service and accounting of the Railroad Admin-

istration, recently stated in a public address that he was opposed to a continuation of government control.

"Now that the reason for government operation has ceased to exist, the railways should, according to the expressed intent of Congress, be returned to their owners. Just how and when this will be done must now be determined and the policy decided upon by the administration should be made known to the security holders and the general public. There are three possibilities—the immediate return of the roads, their return at the end of 21 months following the signing of the peace treaty and their retention until definite legislation is passed which will ensure the healthy and prosperous development of our transportation system under private management.

"With wages higher than ever before, with war traffic gone and nothing to take its place, it would be a calamity to return the roads to their owners without protecting them from the disastrous deficits which would inevitably pile up under the divided and short-sighted regulation of pre-war times."

Lewis J. Spence, director of traffic, Southern Pacific, in an address delivered at the annual meeting of the Traffic Club at New York, expressed his view as follows:

"If my interpretation of public sentiment is correct, whatever benefits have been obtained during federal control are believed to have been outweighed by the disadvantages attributable to the elimination of competition, and the paramount desire of the public is that there shall be a prompt restoration of the benefits of reasonable competition in rates and service. These advantages are not obtainable under unified control and operation; and personally I do not believe that there is any satisfactory middle ground between government ownership and monopoly, on the one hand, and individual ownership, with fair competition, on the other hand."

Heavy Work on a Double Track Line in France

A DOUBLE TRACK cut-off line by means of which much valuable time is being saved in the transportation of men and supplies in France was one of the many projects in the construction program of the American Expeditionary Forces. The cut-off is approximately 5.75 miles in extent and it is located in the zone of the Service of Supply. Its construction involved 160,000 cu. yd. of excavation, 414,000 cu. yd. of embankment, in addition to a bridge one-half mile long spanning

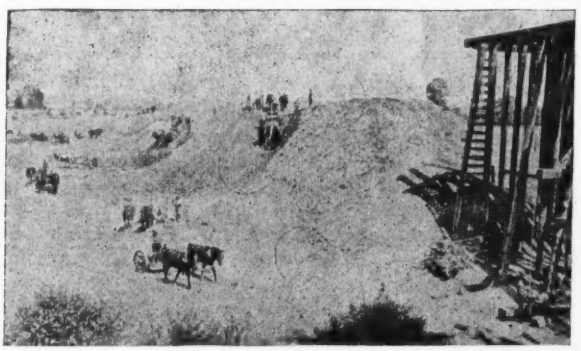
Placing one of the 50-Ft. Lattice Girders

an important French river. Its principal purpose was to provide the means for running trains around the city of Navarre, where several French railroads converge, thus avoiding delays in train movements arising from the congestion of traffic in the city. The cut-off effected the important saving of six to eight hours on every train in addition to five miles in distance between the base ports and the rail heads, back of the front, and in operation east and west bound trains will skirt the terminal and yards passing the city in a direct line, avoiding a long loop into the city which had to be followed prior to the improvement.

In planning the connection between the cut-off line and the existing double track main line, the grade crossing of the two inside tracks occuring in any case where double track lines converge at grade, was avoided by carrying the inside track of the new line over the main line on a steel girder span. Beyond the bridge the two tracks converge to standard double-track construction.

The largest fill on the line contains 180,000 cu. yd. of material. The placing of this fill involved the construction of a timber trestle 40 ft. in height, the material for which was practically all secured by detachments of forestry regiments working French timber lands hundreds of miles from the site. The great part of the fill was secured from a cut to the west of the embankment, being moved by steam shovels and transported to the site in American-made side dump cars. The remainder of the fill was secured from borrow pits near the base of the embankment and moved to place with wheel scrapers.

The bridge portion of the cut-off, 2,190 ft. long, is made up of ninety-nine 14-ft. timber spans and sixteen 50-ft. steel girder spans. This is the longest bridge which engineers of the American Expeditionary Forces have built in France. The timber spans are supported by pile trestle bents, while the longer steel girders rest on pile bent towers of 43 piles. Two pile drivers of the steam-



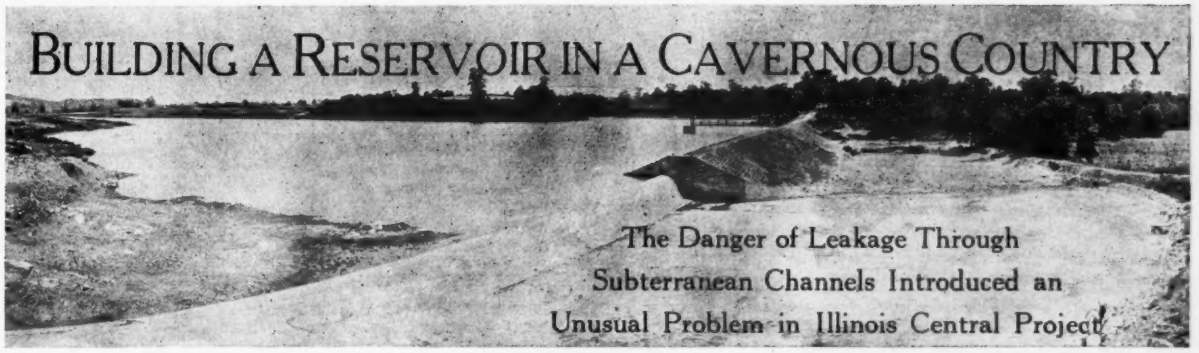
Wheel Scrapers Making a Fill

hammer type worked from each end of the bridge toward the river, while a drop hammer worked westward.

While the 180,000-cu. yd. fill and the river bridge are the outstanding features of the job, other smaller structures had to be built. For example, there is a canal which had to be spanded by a steel girder bridge, several highways where overhead and undergrade crossings had to be built, and a number of roads which called for relocation and rebuilding.

This project was completed early in October. The construction was carried on under the direction of the chief engineer, American Expeditionary Forces, through the Division of Construction and Forestry, by the 16th Engineers (Railway), the regiment recruit in Detroit, and under the direct charge of Lieut.-Col. G. H. Webb, formerly chief engineer of the Michigan Central.

BUILDING A RESERVOIR IN A CAVERNOUS COUNTRY



The Danger of Leakage Through Subterranean Channels Introduced an Unusual Problem in Illinois Central Project

General View of the Illinois Central Reservoir at Princeton, Ky.

THE CONSTRUCTION of a reservoir with a storage capacity of 168,000,000 gal. in a territory in which limestone caves are numerous requires careful investigation in order to insure that the water will not find a subterranean outlet. This was the condition which confronted the Illinois Central when it faced the necessity of securing a larger water supply at Princeton, Ky., on its Louisville-Memphis line. The nature of the tests conducted and the form of construction finally adopted were described by O. T. Dunn, assistant engineer in charge of this work, in the December issue of the Illinois Central Magazine, from which the following information is taken:

To provide an adequate supply of water for trains operating through Princeton, Ky., and for locomotives housed there, it was necessary to conserve a portion of the annual rainfall of the immediate neighborhood for use during a dry period, which occurs in that section almost every year. The water supply has heretofore been obtained from a small creek running through the town, from which water was pumped to storage tanks.

Almost every year the flow of water in this creek stopped entirely for about two months, usually the months of August and September. In such cases it became necessary to haul water by train from the Tennessee river, 25 miles away. To overcome this it was decided to form a storage reservoir, or lake, by constructing an earth dam at some point close to Princeton, and pump through a pipe line to the tanks at the station.

About two and one-half miles southeast of Princeton, on the Evansville-Hopkinsville line, a prospective site for dam and reservoir was found, but owing to the cavernous nature of the surrounding country it was considered wise to first build a small dam to test the bottom of the proposed lake, and determine if there might be any leakage through the surrounding hills, which would prove the location unsatisfactory for the purpose.

At the proposed location the general character of the soil is clay, underlaid with limestone, which outcrops as bluffs in a great many places, also forming deep caverns of unknown depth, and caves, one of which, known as Raccoon cave, is adjacent to the reservoir site.

With this purpose in view, the railroad bought about 248 acres of land in the fall of 1907 and constructed an earth dam, or embankment, 10 ft. high and 600 ft. long along the southern boundary; but before it was completed and the test made, a heavy rain washed 90 ft. of the new fill away.

Nothing more was done towards completing the test dam until the fall of 1914, when the gap washed out in 1907 was refilled and a spillway 90 ft. in length was cut in the hill at the west end of the dam. Again, before the spillway was complete, a heavy rain washed out the 90 ft. of new fill. The gap was immediately refilled and another spillway 50 ft. long was constructed in the hill at the end of the dam, all of which was completed September 1.

On September 7 a light rain filled the reservoir, covering almost 25 acres of land. A gage was placed and readings taken daily for 32 days showed no leakage.

On the morning of October 9 a heavy rain over this water shed caused the water in the reservoir to raise until it was passing out through both spillways. Even then it continued to rise in the lake at the rate of one inch per minute, until it went over the top of the earth fill between the spillways and washed out about 90 ft. of the fill, or about 1,000 cu. yds.

As a result of this test of the reservoir site, the project was considered practicable and a start was made to design an earth dam with concrete spillway sufficient to take care of the sudden excessive rains which occur on this water shed.

Two streams feed this reservoir, the larger of which, known as Eddy creek, passes through a rather narrow valley, with steep slopes of bare rock, making the approach to the reservoir a swift current. The water shed of this stream is about 3,050 acres. The smaller stream, with a water shed of about 550 acres, passes through fairly flat land.

Another source of supply for this reservoir is from Raccoon spring, which flows from the cave mentioned above. This stream is thought to drain about 200 acres, and in time of heavy rains a considerable flow of water will enter from this cave. When the lake is full the mouth of this cave will be completely submerged, and just what effect this may have on the water level in the lake is, as yet, undetermined. It was thought that there might be some leakage from the reservoir through this cave, but that remains to be seen.

The dam is located just below the junction of the two main creeks and about 1,200 ft. down stream from Raccoon cave, at a point where the adjoining hills are only 600 ft. apart, about 2,000 ft. south of the Illinois Central track.

The rainfall statistics for Paducah, Ky., showed the detail run-off records for the Tennessee and Cumberland rivers, and these were used for the purpose of designing the dam for Princeton. The mean annual rainfall is shown as 44.2 in., or 4,620,000,000 gal., for this water shed, and the run-off for this mean rainfall is 2,298,000,000 gal. For the driest year, 1887, 27.69 in. rainfall, the run-off was 1,550,000,000 gal.

By calculation, the maximum probable flood flow from this water shed is 1,680 cu. ft. per second, and this agrees fairly well with the flood flow calculated from an observation on the ground at the time the test dam broke

in 1914. A spillway 200 ft. long would carry this volume of water at a depth of 1 ft. 9 in. over the crest.

The earth fill of the dam, as finally decided on, was to be 20 ft. high, 8 ft. wide on the top, with a slope of 2 to 1 on the down-stream side, and on the up-stream side to the water level, 6 ft. below the top; from this point to the bottom a slope of 3 to 1 was provided. The earth fill was to be sodded on down-stream side with Bermuda grass to prevent erosion, and protected on the up-stream side with not less than 8 in. of rip rap.

For the entire length of the earth fill, extending down into the ground for a depth of 10 ft., a concrete core wall is provided, 2 ft. thick, to prevent seepage underneath the dam.

At the west end of the dam the underlying rock is nearer the surface than at the east end; furthermore, at the west end the rock is of limestone of the best quality, suitable for glass making, while some of the coarser beds could be crushed for building sand.

The rocks in this region appear to belong chiefly to the Mississippian age, and are a series of sandstones, shales and limestones. The limestones of this series occur in beds of 10 to 50 ft. or more in thickness, are of a steel gray to white in color, and contain characteristic marine fauna, by which the individual beds may be distinguished, even where only one appears at the surface.

Excavation for the concrete core wall was carried to such depth as could insure being in a good clay soil which appeared impervious to water. On the east side of the creek there was more sand in the soil than on the west side, while just east of the creek, about 9 ft. below the surface, there was encountered a water-bearing seam of gravel, 12 or 14 in. thick; the bottom of the core wall was carried down 2 ft. below this into a good blue clay.

View of the Dam With the Mill Race on the Left

while at the east end of the dam the outcropping of the rock in the side of the hill shows sandstone; for these reasons the concrete spillway, 200 ft. in length, was located at the west end of the dam.

On account of the property line below the dam at the spillway being quite close and parallel to the line of the dam, it was necessary to plan to convey the flood water, after it had passed over the spillway, along a mill-race, parallel to the line of the dam, to the creek which originally crossed the line of the dam about the center of the earth fill. Along this mill-race the toe of the earth fill of the dam, also a levee constructed between the railroad company and the adjoining property, are well protected by rip rap.

An 18-in. cast iron pipe line extended through the earth dam, with valves in valve pits at each end, and a footbridge, 80 ft. long from the top of the dam to a valve pit in the lake, gave access to the valves, which are designed for the purpose of furnishing water to farmers down the creek for watering stock in time of drought.

The underlying foundation material at the dam site was found to be mostly clay, varying in thickness, overlaying an irregular bed of limestone. At the west end, where the spillway was located, the limestone rock came to the surface and then varied in depth from 10 to 30 ft. below the surface of the ground, until, at the east end, the outcropping of rock showed sandstone of a fine grain and white to gray in color. This sandstone is composed chiefly of silica, and the purest beds of this would be In the creek bed the bottom of the core wall was 15 ft. below the surface, at which point rock was found.

For the purpose of planning the construction of the work, all the information at hand showed the rainfall for this section to be less during the months of August, September and October, and work was started by the contractor the first week of August. The test dam was to be embodied in the new fill and, on account of the gap therein at the creek, it was considered best to plan the building of the earth fill from each hill towards the creek, and when these two sections were completed and the spillway was far enough along, to concentrate all the force on filling the gap at the creek before a rain might come and wash away the unfinished fill.

The first work towards construction was the clearing and grubbing of the entire dam site of all vegetation. The top soil was removed for a depth of one foot from the test dam, and to a depth of four and five feet from the ground adjoining the test dam on the up-stream side. Borrow pits located within the reservoir site furnished a very good material for the new fill and, as fast as the core wall was completed, the grading outfit began building the new earth fill. This fill was made by hauling from the borrow pits to the dam in wheel scrapers, each pulled by two mules. At times each team handled as much as 40 cu. yd. per day. The specifications required the filling material to be placed in the dam in layers of 6 to 8 in. in thickness, and the rolling of each layer as placed by the teams, with a roller weighing 200 lb. per

lineal inch. In addition, the travel of the teams and wheels of the scrapers over the fill helped to compact this to a considerable extent.

By December 1, 1917, the concrete core wall was all in place and by December 5 we began filling in the gap at the creek with earth. The bad weather had set in about November 23, with rain and snow, and on December 8 a snowfall of 18 in., unknown for this section, stopped all team work in the borrow pits for the winter.

From this time on until spring the only work that could be done was the excavation of the spillway hill. The material in this hill was exceedingly difficult to excavate. It contained a very hard red clay, mixed with flint rock, varying in size from ½ in. to 3 in.; also near the surface were large pieces of limestone rock which made it im-

Part of the Spillway. The Wasteway Valve

possible to use a plow, and it was necessary to use dynamite, working with a vertical face, as in a rock quarry. The excavation of this hill was the last thing completed and proved difficult to handle. In this hill there was flint rock, limestone, and a fine grade of soapstone of a bright yellow color streaked with red; also clay varying in color from deep red to blue, and two or three small pockets of pure sand of a bright yellow color; and the face of the excavation, as it was worked, showed many different kinds of material of all colors.

The winter proved to be the severest known in western Kentucky, about four feet of snow falling between November 23 and February 5, with open weather the last part of February and March, which permitted the pouring of concrete. The grading outfit started to work again on March 16. On the night of April 1 a rain flooded the borrow pits within the reservoir site and this water was held in the reservoir by closing the valve in the 18-in. pipe. On April 19 a heavy rain filled the reservoir until water passed through a 25-ft. opening left in the spillway for this purpose to a depth of 2½ ft. This rain put the water up to within about two feet of the top of the unfinished earth fill in the gap at the creek, and caused considerable uneasiness for a short time. On May 15 the last of the concrete in spillway was completed and on May 22 the last of the grading was finished. There then remained the finishing of the rip rap, sodding, and the excavation of the spillway hill, and this was all completed on the afternoon of June 5. That night a heavy rain filled the lake to the top of spillway and the water ran over the crest. It is estimated that the water in the reservoir covers 60 acres of land, containing 168,000,000 gal. The average annual consumption at Princeton is about 100,000,000 gal.

On the edge of the lake, at the track, is a pump house containing two pumps, driven by crude oil engines. These pumps force the water through a 10-in. cast iron pipe line, 15,000 ft. long, to the elevated tanks at Princeton, of which there will be three, and which in turn deliver the water to the six pent-stocks furnishing service to the trains.

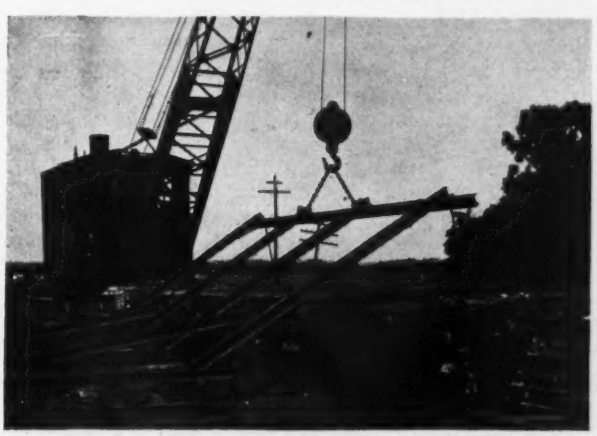
The contractor building the dam was Jos. E. Nelson & Sons of Chicago, while T. S. Leake & Co. of Chicago constructed the pump house and pipe line.

QUICK METHOD OF UNLOADING RAILS

AN INTERESTING ARRANGEMENT has been developed at the rail reclamation plant of the Chicago, Milwaukee & St. Paul at Savanna, Ill., for the unloading of rails at the saw. These rails are assembled in stock piles as they are received from the line and are then

Rack Flat on the Car to Receive Rails

transferred to the saw on flat cars as required. The arrangement which has been devised to facilitate the latter movement consists of a rack composed of six pieces of 100-lb. rails, two of which are 24 ft. long and are laid lengthwise on the car, while the others are 14 ft.



Rack Raised to Slide Rails Off

long and are laid transversely above the two long rails. The shorter rails are fastened to the under rail on the side of the car opposite the saw.

From 50 to 75 rails are loaded from the stock pile onto this rack with a locomotive crane equipped with either a chain or tongs. The rails are placed on the rack so that part of the load is supported on the extension of the transverse rails, and the car is transferred to the rail saw where the locomotive crane raises the outside edge of the rack and dumps the entire load onto the skidway leading to the saw. To facilitate the sliding of the rails into the clear, two skids about 12 ft. long are set in an inclined position with their upper ends adjacent to but clearing the car and the lower ends extending back onto the skidway about 6 ft. The two photographs show the rack loaded and empty and indicate the important saving in labor and time which it has effected. We are indebted to John Reinehr, superintendent of the frog shop at Tomah, Wis., and formerly foreman of the rail mill at Savanna, for the above information.

Railway Maintenance Practices in Australia

FRANK RHEA, commercial agent for the Bureau of Foreign and Domestic Commerce, who recently returned from a trip to the far east, has prepared a report of his investigations which has been issued by the Government. The railway situation in Australia and New Zealand is covered in detail, and as Mr. Rhea was himself formerly a maintenance of way and signal man, with experience on several American railroads, the portion of the report devoted to roadway, track and structures was prepared with an unusually thorough understanding of the subject and is of interest to American railway men occupied with the problems of these features of the railways.

With the present arrangement of handling all public works and the prevailing labor conditions, Australia is not an attractive field for American contractors to enter into and follow. Organized labor objects to the present American practices of pushing the work to a conclusion in the shortest possible time by the use of labor-saving machinery, with day and night shifts. Public opinion supports this position, or at least permits this condition to exist.

Steam shovels and other similar equipment are little used. While this class of equipment could no doubt be used to very considerable advantage, particularly in some of the grade and alinement revision work being undertaken in several of the states, it is very doubtful whether such methods will be adopted so long as the present labor conditions continue.

Bridges are not frequent, and those that do occur are usually small, with few foundation difficulties. In addition, there is a decided tendency for the railway departments to do their own fabricating and erection. This is encouraged by the much higher tariffs on fabricated materials than on plain materials. Bridge paints, on account of the large proportion of dry weather, last much longer in Australia than the average in America. This does not apply to New Zealand, where on account of the amount of wet and warm weather the life of bridge paint is probably shorter than in America.

The principal market for building materials is for galvanized or substitute roofing materials which will not require sheeting, and such substitutes for wood as beaver board. The supply of Australian hardwoods will take care of the needs for building wood, except soft wood required for drawers, shelving, and similar uses where it has to be worked and for which pine will probably continue to be imported from America. Where not subject to special deteriorating influences, galvanized iron apparently has a longer life in Australia and New Zealand than is the average in America, and its use is very much more extensive in all parts of Australasia than in America; in fact, this is the case everywhere in the Far East.

The handling of locomotive coal is done to a very large extent by the use of coaling trestles or man-powered handling outfits or, in some instances, with small locomotive cranes, the latter being particularly the case in New Zealand. Thus far very few really up-to-date coal and ash handling plants have been installed in Australia. At many points it seems probable that these will be installed in the future, but in a number of instances an impression seemed to prevail that the present arrangements were much more reliable than the more modern devices.

Considerable up-to-date water-treatment apparatus has been installed in a number of the states and, with the water conditions existing in a large part of Western Australia, South Australia, and the western sections of Queensland and New South Wales, further installations will no doubt be made. In some instances neutralizing compounds are practicable, and an American company is introducing its products.

Practically all railway lines have to be fenced by the department in all the Australian states and New Zealand. The present practice is to use a rather heavy, smooth, straight wire with frequent anchor posts equipped with expensive slack adjusters. In some instances intervening strands of barbed wire are used, but in no case did the writer see any of the special spiraled wire that is commonly used for right-of-way fences on most American railways. There appears to be a very good opportunity for the use of steel fence posts, especially for the drier parts of Australia, where the ravages of the white ants are most serious.

TIES AND RAILS.

In general, Australia has sufficient timber in sight to take care of present needs, including those of South Australia and New Zealand, both of which have to draw on outside supplies. The ravages of the white ants, the favorable weather conditions, and the light traffic, would appear to make certain parts of Australia, particularly the northern lines of South Australia, a good place for the use of steel ties, if they can be delivered there at a reasonable price. Up to the present time, however, it has been found more economical to use jarrah ties from Western Australia, costing something over $1 each.

It is presumed that the two steel plants now in operation in Australia will be able to take care of the normal rail requirements, but in such case the entire production would apparently be required for this purpose and other lines would not be produced. Such a condition seems very unlikely. During the present very difficult period as regards the obtaining of materials, it is safe to say that the normal rail renewals are not being made, although with the lighter wheel loads and lighter traffic it is probable that the same relative wear does not occur as takes place on the American railways, even when allowances are made for the greater amount of curvature and the steeper grades. New Zealand, having no steel plants, gets all its supplies from abroad, and it is not

probable, for the present at least, that New Zealand will depend to any great extent on Australia, although this may possibly be the case when a scarcity of shipping prevails.

SPECIAL WORK AND FASTENINGS.

The present practice is for all the state railway departments of Australia and the New Zealand railways to manufacture in their own shops, or to have manufactured by concerns in their respective states, all their requirements in frogs, switches, crossings, switch stands, derails, and guard rails, and there seems little doubt that this practice, for the present at least, will be continued. It would appear, however, that they might advantageously employ the special types of light-weight guard rails now coming into general use in America, that they would at least be warranted in installing hardened-faced frogs and switches in some particular situations, and that these could be produced by importing the hardened parts and completing the work in the railway shops. A few of the lifting type of derails, especially the "Hayes" design, have been used, but these are very infrequent as compared to the total in service. Many are of the complete switch type, which are more expensive to install and maintain than the most costly designs of the lifting type.

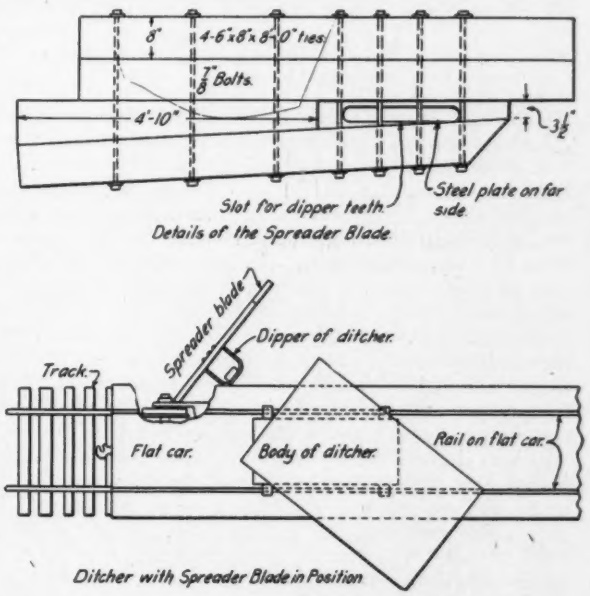
As a general practice, the angle bars are bought with the rail. All the Australian state railways follow the same course with the manufacture or purchase of their supply of dog spikes and track bolts as with their frogs and switches. The supply in New Zealand is usually purchased abroad, particularly fang bolts and screw spikes. At present no guard rail clamps are used, and few tie-plates, except in some cases around turnouts. It would seem that both of these, particularly the guard-equipment of roadway and track tools, and in a considerable number of instances the American track tool would be very well received by the Australian "ganger," as he is called. A very considerable use of American hand tools by all classes of railway mechanics was also noted. The use of rail anchors is becoming very extensive, and most of those used thus far are of the Vaughn design, furnished by the Railway Track Supply Co. of London. One point that applies to the maintenance of all the patented rail anchors, when employed on Australian railways, is the necessity of inspection to prevent the ballast from loosening the rail anchor as the result of the very much fuller ballast section used, because of the ties being only five inches in thickness.

A NEW USE FOR A DITCHER

THE USE OF A DITCHER for bank widening operations with the aid of a home-made spreader blade enabled maintenance forces on the Northern Pacific in the vicinity of Glendive, Mont., to carry on the work by mechanical means, although a regular air-operated spreader was not available. The special equipment required was inexpensive and did the work well, while the arrangement materially increased the time that the ditcher could be profitably employed.

The home-made spreader blade was attached to the teeth of the dipper, with the latter in a lowered position along side the car. The construction of the blade is shown in the drawing and consists of four 6-in. by 8-in. by 8-ft. sawed ties, two used without any change and the other two cut to the special shapes indicated. The four pieces are bolted together and covered on one side with a sheet of steel 1/16 in. thick to increase the strength and provide a smoother surface for the dirt to slide on. The space left between the bottom stick and the second one above it at one end of the blade is provided to receive the teeth of the dipper. The second sketch shows the position of the blade ready for use. The inner end rests just back of the journal box on the front wheel of the front truck, while the dipper is usually in bearing against the side of the car and is secured against a tendency to slide back along the car under the pressure of the spreader blade by means of a chain passing through a stake socket on the car and through the dipper arm.

It takes from 6 to 10 min. to put the spreader blade in position and from 4 to 5 min. to take it off. The entire weight is only about 350 lb., so four laborers have little trouble putting it into position. The operation is performed by dropping the blade on the ground close to the car in front of the dipper, which is hanging with the arm straight down. Then by raising the boom until the dipper teeth are about 12 in. off the ground the blade can



The Spreader Blade and Manner of Using It

be readily placed over the teeth. In placing the load on the blade the engineer is signaled to start slowly ahead until the spreader gets well into the dirt, while the operator eases up on the hoisting brake until the chain to the stake socket tightens, when he puts the brake down and locks it.

This arrangement has worked very satisfactorily in loose gravel. Last season 291 cars of gravel at Fallon, Mont., on the Northern Pacific were unloaded to raise the main line and side track and to make fills. All this material was spread with this attachment and after the tracks were raised the device was again used to dress up the shoulders. In this way a ballast section was obtained that was practically as neat as it could be shaped by gangs. By lengthening the chain and allowing the dipper to swing out and lower about a foot, a second shoulder was made and the surplus material scraped to the foot of the embankment, making a neat looking roadbed. By this means an amount of work was done in about 45 min., which it is estimated would have taken a gang of 30 men three days. In other waste materials, such as gumbo and cinders, the arrangement proves very satisfactory, as it can be set any distance out from the end of the ties and thereby not spoil the gravel shoulder.

It can also be used in closer quarters, as it cuts around tanks and other close structures.

Some precautions are necessary in using a ditcher in this manner. Care must be taken by those in charge not to attempt to sink the spreader blade into old solid roadbed. When the dipper is chained against the side of the car there is not much opportunity for over-straining any of the connections of the dipper arm or the boom, but when it is necessary to bring the dipper out from the car, precautions must be taken not to overload it. The ditcher must also be carefully blocked on the rails whenever it is used in this manner. It is always better to go over the work twice, taking a shallow cut the first time, if it appears to be too heavy to be done in a single trip. This work was done with an American railroad ditcher under the direction of W. P. Murn, roadmaster, Northern Pacific, Glendive, Mont.

REPLACING TEE RAILS WITH GIRDER RAILS

By W. F. Rench

SOME INTERESTING PROBLEMS were presented for solution in the course of a recent installation of 9-in. girder rails replacing 85-lb. tee rails in a yard of the Baldwin Locomotive Works at Philadelphia, where the movement of cars could not be interrupted. The work was both handicapped and helped by the continuous operation of a locomotive crane. In fact, without the advantage of the crane the placing of the switch members, which were of the solid manard type, would have been costly and slow. The restricted area for effective working made the use of the crane a practical necessity. The means adopted to render the work permanent illustrate the present tendency to obtain a more substantial roadbed for sidings wherever the service is heavy.

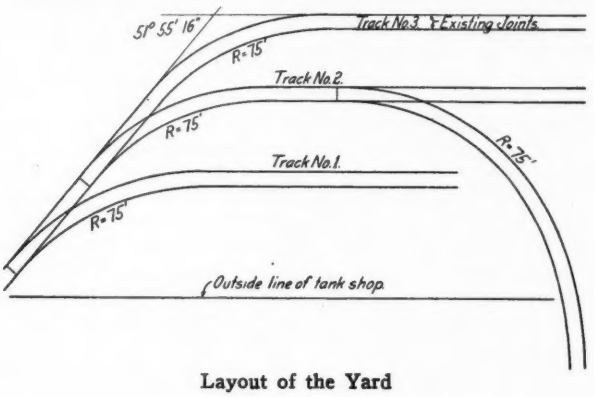
It was determined to install the new work on a 6-in. bed of new stone ballast in place of the worn-out cinders under the old tracks. The ties were to be renewed in face, using creosoted ties laid on 22-in. centers, or 18 to a 33-ft. rail. The track was to be tamped as soon as laid to a uniform grade and in true level. It was especially required that no kinks or tight gage should occur at any point. The renewal in track No. 3 had to meet the joints in existing girder rail; the line of track No. 2 had to conform to that of the track entering the tank shop; and the position of track No. 1 was exactly determined by the piling spaces required on either side.

The first and most important work was the survey, establishing the line in precise agreement with the manufacturers' general plan of the layout, and also fixing the desired grades of the several tracks. The difficulties in the way of accurate instrumental work were many, but the survey was continued until the data of the plan were exactly met. It was realized to be a mistake to suppose that special work will adjust itself, for even a slight variation in the early stages would have seriously affected the succeeding work, not only as regards the physical detail, but also in the wear of the rails and the movement of cars.

The installation of the first two switches necessitated suspension of the movement and these switches were therefore renewed between Saturday noon and Sunday evening. The locomotive crane was stationed on track No. 1, to deliver and place the switches, mates, frogs and rails; a car of new ballast was left standing on track No. 2, and an empty car was set on track No. 3 to receive the old ballast. To facilitate the assembling of the switch ties a temporary curb of 4-in. by 6-in. timbers was laid along the straight side of the turnouts. Upon it was indicated the position of the several ties and their appropriate lengths, so that there was no confusion or delay incident to the placing of them.

The matter of compromising the girder and tee rails throughout the work to effect the temporary closing, which was necessary on occasion, was a detail that had to be determined. The difference in the elevation of the bottom of the tee and girder rails was 4 in. It was found that no harm resulted, either to the track or to the new rails, from tilting the ties this amount. The heavy service prohibited the blocking up of the lighter rail. The compromise joints furnished with the new material were moved forward as the work progressed.

The usual method of applying the ballast was first to clean out the cribs to a depth of 4 in. below the bottom of the ties, loading the dirt at once upon a car set at a convenient point. When the use of the track could be spared for a day, so much of it as could be completed was torn up and the remainder of the old ballast loaded on the car. A level bed of new ballast was then spread and the new track laid upon this and closed up tempor-



Layout of the Yard

arily. Care was taken to keep the grade 1½ in. low to permit a final surfacing to the fixed elevation.

In the periodical closing up it was necessary to cut a tee rail several times while spiked down in the track. This was accomplished most readily by applying a steady downward pressure upon the free end of the rail by means of a long wooden lever, while cutting was continued at the required point. In deflecting the rail to conform with the slightly changed location of the new work constant use was made of the track jack in preference to the lining bars.

As a safety measure, the tie rods were not applied until the moment the paving of the tracks was to be proceeded with. Each of the three switches was provided with an enclosed spring ground throw. Wheel clearances were made 4½ in. and all work was designed to suit the gaging and contour of M. C. B. wheels. The gage of the track was 4 ft. 8½ in. on the tangents and 4 ft. 9 in. on the curves. Adherence to the established gage was of importance to avoid severe wear upon the channels of the girder rail.

AN INGENIOUS CHRISTMAS GREETING.—The Santa Fe System has sent to each of the 54 members of its office force now with the colors an illustrated blue print, prepared by E. S. Rice, chief clerk of the chief engineer, inscribed with the names of the honor men and with a poem entitled "The Engineer—If," by Major Robert Isham Randolph, of Isham Randolph & Co., Chicago. Three supplementary verses on military work are also given.

ACTIVITIES OF THE RAILROAD ADMINISTRATION

Some Interpretations of Disputed Points in the Wage Advance Supplements

Rules Governing the Construction and Payment for Industry Tracks

THE RAILROAD PROBLEM now occupies a position before the public second only in importance to that of reconstruction. Everyone is agreed that some solution must be devised in the near future. President Wilson, in his address before Congress on December 2, just prior to his departure for Europe, pointed out the necessity of prompt Congressional consideration of this question, stating that he had no plan of his own to propose, but that it would become his duty to relinquish control of the roads even before the expiration of the statutory period unless there should be a prospect of a legislative solution in the meantime. Director-General McAdoo has urged the extension of federal control for a period of five years and other prominent men have offered other solutions, as outlined in another column. The future of the railroads will undoubtedly continue to receive close attention for the next few months, until some course of action is determined upon.

Interest in events in the Railway Administration at Washington during the past month has centered largely in the selection of a successor to Wm. G. McAdoo as director-general. Since he announced his resignation on November 22, there has been a marked cessation of activity in the Railway Administration and a tendency to postpone the inauguration of new policies. This has been evidenced particularly in the Division of Capital Expenditures where many requests for authority to undertake improvement work have been returned to the roads without approval. In frequent cases, work already under way has been discontinued, particularly when the corporations have shown an unwillingness to approve the expenditures. Second only in interest to the resignation of the director-general was that of Judge Lovett as director of the Division of Capital Expenditures on December 5, effective January 1. Judge Lovett returns to the Union Pacific, on which road he has been elected president. No successor has been appointed for either Mr. McAdoo or Mr. Lovett at the time we go to press.

In Circular 140 the Southwestern regional director announces that the Facilities Division of the War Industries Board has cancelled restrictions on the class of material to be used in the construction of tanks or in other railroad projects.

The jurisdiction of the Allegheny region has been extended to include all of the lines of the Pennsylvania and the Baltimore & Ohio, west of Erie, and Pittsburgh, Pa., and Parkersburg, W. Va. This step was taken to restore the integrity of these trunk lines whose properties have heretofore been divided between the eastern and the Allegheny regions.

Clearance Warning

The Eastern regional director, file 1800-100A304, states that at a recent meeting of a General Safety Committee, the following suggestion was submitted and approved for adoption:

> Install a board in a conspicuous location at or near switch stands of tracks that lead to industries where there are obstructions that do not afford sufficient clearance. These signs should read substantially as follows:
>
> CAUTION
> THESE BUILDINGS WILL NOT CLEAR A MAN ON TOP OR SIDE OF CARS.

In the construction of new sidetracks particular care should be taken to see that proper clearance standards are observed so as to avoid such conditions, as the elimination of the source of danger is, of course, more effective than the placing of cautionary signs.

Budgets for 1919

The railroads are now engaged in preparing their budgets of improvements for 1919. These are to be submitted to the Division of Capital Expenditures as a preliminary estimate of the requirements for the year, but specific requests for authorization will be made separately and in view of the uncertainty as to the volume of traffic and the high prices now prevailing, the requests for authorization are not expected to amount to as much as the budget estimates. It is probable also that the Division of Capital Expenditures will not make any authorizations for next year except for such work as the corporations are willing to undertake and finance.

In a statement issued by the Railroad Administration shortly after the director-general's resignation, it was stated that authority had been granted up to November 10 for Additions and Betterments work (excluding equipment and new extensions) aggregating $533,850,502, and that only about one-half of this amount would be completed this year. It was further estimated that corresponding Additions and Betterments which must be authorized for 1919 will aggregate upwards of $250,000,000, excluding equipment, and that a total of roadway improvement work approximating $550,000,000 must be done next year.

Only 38.7 per cent of the amounts specifically authorized for capital expenditures had been expended by Class I roads from January 1 to November 1, 1918, according to a report by the Division of Capital Expenditures. Total expenditures to November 1 chargeable to capital account amounted to $463,617,707, while the total authorizations chargeable to capital account amounted to $1,199,-

426,026, while the original budgets and additions amounted to $1,002,513,844. In addition to the usual monthly report the Railroad Administration has given out a table showing the authorizations and expenditures for individual roads.

Wage Schedule Interpretations

The director-general issued interpretation No. 1 to Supplement No. 8 (affecting maintenance of way employees) to General Order No. 27 on November 23 as follows:

Overtime Monthly, Weekly or Daily Paid Employees

Article I

Eight consecutive hours, exclusive of the meal period, constituting a day's work from the effective date of Supplement No. 8 to General Order No. 27, the increases provided for therein and applicable to monthly, weekly and daily paid employees specified in Article 1, paragraphs (a), (b), (c) and (h), and Article II of Supplement No. 8, are based upon the recognized number of working days constituting a calendar year (including Sundays and or holidays where they have been considered a part of the employee's assignment), and the rates of pay in effect January 1, 1918, prior to the application of General Order No. 27, exclusive of overtime. The following exemples illustrate the method to be used in establishing the straight time hourly rate as the basis of payment for overtime service:

Example (a): Employees working 30 days per month on the monthly, weekly or daily basis, at a wage amounting to $85 per month on January 1, 1918, prior to the application of General Order No. 27, would on September 1, 1918, under Supplement No. 8, Article 1 (a), automatically advance to the basic rate of $90 per month, plus $25 increase, establishing the rate of $115 or $1,380 per year. In computing the pro rata per hour for overtime pay for monthly, weekly or daily paid employees, take the number of working days constituting a calendar year, multiply by eight and divide the annual salary by the total hours, exclusive of overtime and disregarding time absent on vacations, sick leave, holidays, or for any other cause. In determining the hourly rate, fractions less than one-fourth of one cent shall be as one-fourth of one cent; over one-fourth and under one-half, as one-half cent; over one-half and under three-fourths, as three-fourths; over three-fourths, as one cent.

Example (b). Yearly wage $1,380 ÷ 2,880 hours = 40.97 or 41 cents per hour.

Example (c). Yearly wage $1,500 ÷ 2,880 hours = 52.1 or 52.25 cents per hour.

Example (d). Yearly wage $1,800 ÷ 2,880 hours = 62.5 cents per hour.

Example (e). Yearly wage $2,100 ÷ 2,880 hours = 72.91 or 73 cents per hour.

Example (f). Yearly wage $2,400 ÷ 2,880 hours = 83.33 or 83.5 cents per hour.

NOTE: It is to be understood that 2,880 hours is illustrative only; the hours per year will vary as the assigned work days in a year vary.

Article II

On February 21, 1918, the Director General issued General Order No. 8, paragraph 3 thereof reading as follows:

"The broad question of wages and hours will be passed upon and reported to the Director General as promptly as possible by the present Railroad Wage Commission. Pending a disposition of these matters by the Director General, all requests of employees involving revision of schedules of general changes in conditions affecting wages and hours will be held in abeyance by both the managers and employees. Wages, when determined upon, will be made retroactive to January 1, 1918, and adjusted accordingly. Matters of controversy arising under interpretations of existing wage agreements and other matters not relating to wages and hours, will take their usual course, and in the event of inability to reach a settlement, will be referred to the Director General."

If employees coming within the scope of Supplement No. 8 to General Order No. 27 were paid a punitive rate for overtime after the regular day's work, Sundays and or holidays prior to February 21, 1918, the same conditions should apply on the eight hour basis. Any punitive overtime rate established for employees under this interpretation since February 21, 1918, except as established by the Director General, is unauthorized and cannot be recognized.

Example (a). Employees working ten hours per day January 1, 1918, prior to the application of General Order No. 27, and who were, prior to February 21, 1918, paid at the rate of time and one-half time for overtime, should be paid as follows:

8 A. M. to 12 noon.....	4 hours' work
12 noon to 1 P. M.....	1 hour for meal excluded
1 P. M. to 5 P. M.....	4 hours' work
5 P. M. to 7 P. M.....	2 hours, at rate of time and one-half time.
Elapsed time.....	11 hours
Time for meal.....	1 hour deducted
Overtime	2 hours
Total time to be paid for...	11 hours

Example (b). Overtime commences immediately following the eighth consecutive hour of continuous service, after deducting the meal period.

On the basis of pro rata time for the ninth and the tenth hour.

8 A. M. to 12 noon.....	4 hours' work
12 noon to 1 P. M.....	1 hour for meal excluded
1 P. M. to 5 P. M.....	4 hours' work
5 P. M. to 7 P. M.....	2 hours' overtime, pro rata rate
7 P. M. to 9 P. M.....	2 hours' overtime, 1½ times pro rata rate
Elapsed time.....	13 hours
Time for meal.....	1 hour deducted
Continuous service.....	112 hours
Total time to be paid for...	13 hours

Example (c). Employees working straight through eight consecutive hours.

6 A. M. to 2 P. M.....	8 hours' work
2 P. M. to 4 P. M.....	2 hours' overtime, pro rata rate
4 P. M. to 6 P. M.....	2 hours' overtime, 1½ times pro rata rate
Elapsed time.....	12 hours
Continuous service.....	12 hours
Total time to be paid for...	13 hours

Hourly Rates

Article III

The employees coming under the provisions of paragraphs (e), (f) and (g) of Article I of Supplement No. 8 to General Order No. 27, who were, on January 1, 1918, prior to the application of General Order No. 27, paid on a basis of ten hours or more to constitute a day, for whom hourly rates have been established as per the above specified paragraphs, shall, on and after September 1, 1918, the effective date of Supplement No. 8, receive one-eighth of the wages received for ten hours on January 1, 1918, prior to the application of General Order No. 27, as their basic hourly rate, to which shall be added 13 cents per hour for the employees coming under the provisions of paragraphs (e) and (f), observing the minimum rate; and 12 cents per hour for the employees coming under the provisions of paragraph (g), provided the hourly rate thus obtained shall not exceed the maximum rate of 40 cents per hour.

Example (a). Employees coming under the provisions of Article I (e), on a ten hour basis, rate $3.75 per day; one-eighth of 375 equals 46.87 or forty-seven cents per hour; adding the increase of 13 cents per hour produces a rate of 60 cents per hour.

The same method of procedure will apply to the employees coming under the provisions of Article I (f).

Example (b). Employees coming under the provisions of Article I (g), on a ten hour basis, rate $2.35 per day; one-eighth of 235 equals 29.37 or 29.5 cents per hour; adding the increase of 12 cents per hour produces a rate of 41.5 cents per hour, the rate would revert to the maximum of 40 cents.

NOTE: To determine the hourly rate to be paid employees on the hourly basis and for whom ten hours or more were the established hours of service, use the method and examples (a) and (b) of above Article III, for both classes working less than ten hours, and over eight hours, one-eighth of the wage received for the number of hours recognized as a day's work.

Pay for Calls

Article IV

Employees who are notified or called to work outside the eight consecutive hours, exclusive of the meal period and continuous service, constituting their regular assignment, shall be paid a minimum allowance of three hours for two hours' work

or less; if held over two hours, time and one-half time will be paid, computed on the minute basis.

Example (a).

8 A. M. to 12 noon.....	4	hours' work
12 noon to 1 P. M.....	1	hour for meal excluded
1 P. M. to 5 P. M.....	4	hours' work
6 P. M. to 7:30 P. M.....	1½	hours' overtime, 1½ times pro rata rate
Elapsed time.....	11½	hours
Time for meal.....	1	hour
Break in continuous service..	1	hour
Time for call.....	3	hours, minimum guarantee
Total time to be paid for...	11	hours

ARTICLE V

Exclusive of employees whose regular assignment includes Sundays and or holidays, employees notified or called to work on Sundays and or holidays will be paid not less than the minimum allowance of three hours, and where no existing agreement or practice is more favorable, such employees will be paid as per Examples (a) and (b) of Article II.

ARTICLE VI

Payment of overtime at a rate in excess of pro rata will be computed from and added to the pro rata rate.

ARTICLE VII

Unless acceptable to a majority of employees in a department or subdivision thereof, the meal period shall not be less than 30 min. or more than 1 hr.

ARTICLE VIII

Where unjustifiable inequalities develop or exist in the rates of pay for relatively the same service and responsibility, as between employees of the same class within the respective groups, as specified in Supplement No. 8 to General Order No. 27, the regional directors are hereby authorized to establish uniform rates of pay by zones or districts throughout their respective regions, under the following conditions:

(a) The maximum rates established by Supplement No. 8 to General Order No. 27, must not be exceeded (note exception in (d) following).

(b) Rates established by Supplement No. 8 to General Order No. 27 must not be reduced.

(c) The specified differentials in the established maximum rates for hourly workers to be preserved.

(d) Where differentials in wage rates existed for common labor in favor of tunnel gangs and tunnel and elevated common labor, such differentials should be maintained, but in no case extended to create a greater differential than heretofore existed.

(e) All rates herein provided for shall be filed by the Regional Directors with the Board of Railroad Wages and Working Conditions.

WAGES OF HOUSE AND BRIDGE CARPENTERS

Interpretation No. 2 to Supplement No. 8 to General Order No. 27, issued on November 30, reads as follows:

QUESTION

Is it intended that house and bridge carpenters in the maintenance of way service shall receive the rates of pay and be governed by the conditions specified in Art. I, Section 6, of Supplement No. 4 to General Order No. 27, under the hearing of car men?

DECISION

House and bridge carpenters in the maintenance of way service come under the provision of Supplement No. 8 to General Order No. 27 and their rates of pay are established as per paragraph (e), Article I of Supplement 8.

LIMIT TO WAGE INCREASES

That there is a limit to the wage advances to be made by the Railroad Administration is made clear in a letter written by Director-General McAdoo under date of November 27 to G. H. Sines, chairman of the Board of Railroad Wages and Working Conditions, in reply to a letter enclosing communications and petitions signed by railroad employees protesting against Supplements Nos. 7 and 8 to General Order No. 27 on the ground that the increases for shop and maintenance of way employees were not made retroactive to January 1, instead of September 1.

"As I have previously stated," Mr. McAdoo said, "I am obliged to consider, not only the interests of the employees of the railroads, but also the interests of the people of the United States, in determining questions of wages and working conditions. The officers and employees of the railroads are no longer servants of private corporations; they are now servants of the public. The director-general is also a servant of the public, owing a duty to the public as well as to the employees. I cannot be indifferent to the interests of the public any more than I can be indifferent to the interest of the employed, and my constant effort has been to find the line of justice as represented by fair wages and working conditions, and square it with the interest of the employees and the interest of the public.

"I have not hesitated to announce decisions which involved immense increases in the wages of railroad employees throughout the country, estimated at over $500,000,000. These increased wages must be paid by the people of the United States, and in order to pay them I some time ago announced large increases in freight and passenger rates. Numerous protests against these have been made by shippers and farmers and other organizations throughout the country, and warn us all that we must keep our demands within reasonable limits, because there is a point beyond which the public will not sustain us in raising wages.

"At my direction, on May 25, 1918 (General Order No. 27), railroad employees in all crafts were granted increases in rates of pay, and for reasons with which you are familiar, these rates of pay were made retroactive to January 1, 1918. The employees named in Supplements 7 and 8 received increases in their rates of pay at that time; and, as stated in General Order 27, no problem so vast and intricate as that of doing practical justice to the two million railroad employees of the country could be regarded as completely settled and disposed of by any one decision or order. Therefore, your board was established to take up, as presented, any phases of the general problem relating to any class of employees or any part of a class of employees which still justly call for further consideration. At my direction the claims of employees mentioned in Supplements 7 and 8 to General Order 27 were given further consideration by your board, and after an exhaustive investigation, decisions embodied in Supplements 7 and 8 were rendered.

"It is true that wages in excess of those provided for in Supplements 7 and 8 are paid in some localities and by some industries, but these are of a transient character, such as shipyards, munition plants, etc., and their work will cease or be greatly reduced upon the return of peace. It is, however, undeniably true that the wages established in Supplements 7 and 8 compare as a class favorably, and perhaps much more favorably, with those paid elsewhere.

"When we consider these railroad wage questions, it must be remembered that the railroad business is not temporary, such as referred to above, but of a permanent character, and offering to employees steady work. It must also be remembered that the revenues of the railroads are not affected by the varying conditions which permit private enterprises to earn high profits, but, on the contrary, are limited by rates fixed by lawful authority and measured by the ability and willingness of the public to pay them. Railroad employment is also not affected to the same extent as are other industries, by fluctuations and uncertainties, due to dull periods. Railroad employees not only have steady work and, generally speaking, more favorable living conditions as against temporary and uncertain employment, and frequently less satisfactory living conditions in war industries, but they also have a reasonable amount of free transportation for

themselves and their families, as well as other privileges and advantages which are everywhere recognized as of substantial benefit to them.

"Contrasting the permanency of railroad employment, the opportunities for promotion and other privileges enjoyed, the bases established in Supplements 7 and 8, in my judgment, are fair and reasonable. From reports, communications and resolutions I have received from railroad employees in various parts of the country since Supplements 7 and 8 were promulgated, the vast majority of railroad men appear to be satisfied with those orders, and I am sure that they are willing to give loyal, faithful and efficient service to their government at the rates of pay prescribed therein. We cannot justify to the American people the great increase in wages and the immense improvements in working conditions already granted unless every employee proves by his work that he is worthy of it. I want the men to prove themselves worthy of it, and I believe that they will.

"Your board has given all the time and thought to this particular matter which it is right and proper for them to do, and it is essential that they should now give consideration to the matters arising with respect to other employees.

"I cannot, therefore, see my way clear at this time to direct that the board should reopen this particular matter, as there has never been a time when the public interest demanded more urgently the devotion and unselfish services of all classes of railroad employees.

"It is necessary that the employees of the railroad should understand that the decisions made in Supplements 7 and 8 cannot now be reviewed, as it is not practicable at this time, with the reconstruction period before us, to consider the matter, and it was not my intention following the promulgation of General Order 27, in granting further increases in rates of pay, that they should be retroactive to January 1, 1918."

RULES GOVERNING INDUSTRY TRACKS

Director-General McAdoo has issued Supplement No. 1 to General Order No. 15, which prescribed requirements for new industry tracks, as follows:

1. General Order No. 15 is not to be construed as requiring or authorizing a federal manager to enter into a contract on behalf of the director general to pay for that part of an industry track on the right of way from the switch point to the clearance point where, in the judgment of the federal manager, the amount of traffic to be derived by the United States Railroad Administration from the construction of the industry track is not sufficient to justify such expenditure. In cases where, in the judgment of the federal manager, the circumstances justify the construction of an industry track, but the amount of revenue to be derived therefrom by the United States Railroad Administration does not justify the payment by the director general of the cost of that part of the track on the right of way from the switch point to the clearance point, an agreement may be made, otherwise in accordance with General Order No. 15, but providing for the payment of the entire cost of the track by the shipper with a provision for refund up to, but not exceeding, the cost of the part of the track from the switch point to the clearance point, at the rate of $2 per car of carload freight yielding road haul revenue, delivered on or shipped from the track during federal control.

2. Track material contained in that portion of an industry track on the railroad right of way which was installed and paid for by the industry during federal control, shall remain the property of the industry, except to the extent that refund of the cost thereof shall have been made by the railroad or the director general, but such ownership shall be subject to the right of the railroad to use the track when not to the detriment of the industry.

3. Upon the discontinuance of use of an industry track for the purposes of the industry, the industry shall have the right to have the track material on the right of way which was paid for by the industry during federal control, taken up and delivered to the industry except to the extent that the cost of such track material shall have been refunded to the industry by the railroad or the director general. The work of taking up the track shall be done, if the federal manager shall so desire, by the forces of the federal manager, but in any event at the expense of the industry.

In Circular No. 146, issued by the director of the Southwestern region on December 18, an interpretation of Supplement No. 1 to General Order No. 15, received from Walker D. Hines, assistant director-general, is given as follows:

In connection with Supplement No. 1 to General Order No. 15, providing in substance that where in the judgment of the federal manager an industry track ought to be constructed, but the revenue to be derived therefrom by the Railroad Administration will not justify the payment by railroad of the cost of the track from the switch point to the clearance point, an agreement may be made for the payment of the entire expense by the industry with provision for partial refund, it is felt that circumstances differ so greatly that a rigid rule cannot be laid down to control the judgment of the federal manager as to the cases which will justify a contract in accordance with the original terms of General Order No. 15, and therefore no such specific rule has been embodied in the supplement.

For your information and that of the federal managers, I would advise that it will be considered reasonable to enter into a contract under the original terms of General Order No. 15, whereby the railroad will pay at the outset for the cost of that part of the track between the switch point and the clearance point when the federal manager believes that for the first two years after beginning operation of the track the average monthly gross revenue accruing to all railroads under federal control on business to and from the industry will be equal to 15 per cent of the expense assumed by the director general for the construction.

This is not stated as an invariable rule to require the making of such a contract under the circumstances stated, or to prohibit the making of such a contract in the absence of expectation of such an amount of revenue. It is, however, believed to be a fair working rule for application except in cases where special circumstances indicate that some other reasonable rule should be applied. Where the federal manager does not apply the working rule here suggested, he should report his action, either favorable or unfavorable, and his reasons therefor to the regional director, so that the latter, if he thinks proper, may make further suggestions for the guidance of the federal manager in future cases.

While Supplement No. 1 expresses no reservation, it is to be understood that in cases where a shipper claims that under Federal or State law he is entitled to a track on other terms, his claim shall be considered and transmitted through the regional director to the director of the Division of Public Service and Acounting for his consideration.

COLLECTING MAINTENANCE DATA

Owing to the fact that all of the railroads cannot get their maintenance records in a form that permits of the preparation of the data, called for in Circular No. 22 of the Division of Operation (asking for certain maintenance information to be sent to C. A. Morse, assistant director in charge of maintenance and engineering, see *Railway Maintenance Engineer*, December, 1918, page 424), a further meeting of the committee of engineering assistants to the regional directors was held with Mr. Morse at Washington on November 26. The eastern regional director quotes from a letter from Mr. Morse, under date of November 30, in a circular issued to the roads in that region on December 4, relative to the decision reached in this conference regarding the compilation of this information as follows:

Since the previous meeting of the committee the engineering assistants of the regional directors had called meetings of the chief engineers, maintenance officers and accountants of their regions and had discussed the question of the information necessary for the proper comparison of the maintenance of roadway and structures during the period of federal control, as compared with the test period, and the ability of the various carriers to furnish same. Reports of the results of these meetings were read and a general discussion followed as to what data should be requested in the light of information furnished as to the ability of carriers to furnish same without undue increase of force and expense in tabulating. The ideas of the commit-

tee as expressed in this discussion were generally about the same.

Blanks will be gotten up by this office within the next few days for compiling the information that seemed the most desirable and will be sent out to the engineers of each region for criticism and further suggestion before final issuance. It is my thought that these forms should not call for information other than is felt absolutely necessary, with the idea that if further information is necessary in the case of some particular lines, we can call for that later.

The committee discussed a circular which had been proposed in one region regarding the inspection of rail and it was the thought of the committee that, considering the shortage of rail during both 1917 and 1918, it was important that such an inspection should be made by all railroads. The circular was revised to make it applicable to all railroads and has been sent to the director of the Division of Operation with the recommendation that it be issued.

There was a thorough discussion of Circular No. 22 and it was found that gross-ton freight traffic data had not been kept on more than half of the railroads. It was agreed that for the purpose required the carriers could take the net ton miles or the sum of the revenue and non-revenue ton miles on their lines, and by taking the gross ton miles for the month of October, 1918, which they are having to furnish the Railroad Administration, get the ratio between the two. By applying this ratio for the four years called for in Circular No. 22, it would give the information required. It was decided that on the smaller roads where they had not kept their records by divisions the figures for the total road would be acceptable. Also that where this information had not been kept separately by main and branch lines, it would be acceptable to have it for the division as a whole, and on the smaller roads for the road as a whole. It was found that this information could not be secured on terminals, and it was decided that we would eliminate terminals as far as furnishing this information was concerned. It was also found that ties, tie plates and anti-creepers could not be separated as between main and branch lines and sidings, and that we would have to accept this information without separation.

Tie Treatment Will Reduce Requirements

BY A. GIBSON,

Superintendent Timber Preservation and Tie Treating Plants, Northern Pacific, Brainerd, Minn.

THE RAILROADS can promote the conservation of timber in no more effective way than by the treatment of their cross ties, bridge and other timbers with a preservative which will extend their life at least 2½ times. This has progressed to the point where it is no longer an experiment, for adequate service records are now available to demonstrate the accuracy of the statement.

We should not lose sight of the fact that during the years gone by we were drawing our tie and timber supply from virgin forests and the timber used was very high grade. We have now reached the period where second growth trees are being cut and young growth trees are much inferior to what we were getting 15 years and more ago. The result will be shorter life and in consequence a larger consumption.

The annual requirements for cross ties alone are appalling. We have about 290,000 miles of main tracks. Figuring 3,000 ties per mile this will require 870,000,000 cross ties; if the average annual life untreated is estimated at six years this means that main track renewals will require approximately 145,000,000 ties. It is also

SAVING PER TIE PER YEAR

Table showing economy in treating cross ties; with ties and creosote at prices indicated, on the basis of labor for placing in track at 25 cents per tie, 8 cents for handling and treating at tie plant and allowing 5 per cent for 15 years on treatment, including all labor and material at tie plant; assuming that treated ties will last 15 years and untreated 6 years.

Creosote per gal.	Cross ties at 40c	at 45c	at 50c	at 55c	at 60c	at 65c	at 70c	at 75c	at 80c	at 85c	at 90c	at 95c	at $1
$0.060	$0.0387	$0.0433	$0.0486	$0.0533	$0.0587	$0.0633	$0.0686	$0.0733	$0.0786	$0.0833	$0.0886	$0.0933	$0.0986
.065	.0370	.0423	.0476	.0520	.0573	0.620	.0673	.0720	.0773	.0820	.0873	.0920	.0973
.070	.0353	.0407	.0460	.0500	.0553	.0600	.0653	.0706	.0753	.0800	.0853	.0900	.0953
.075	.0340	.0393	.0443	.0486	.0540	.0586	.0640	.0686	.0733	.0786	.0840	.0886	.0940
.080	.0326	.0373	.0426	.0473	.0526	.0573	.0626	.0673	.0726	.0773	.0826	.0873	.0926
.085	.0313	.0356	.0410	.0456	.0510	.0556	.0610	.0656	.0710	.0753	.0807	.0860	.0900
.090	.0300	.0347	.0393	.0447	.0493	.0541	.0600	.0646	.0693	.0746	.0793	.0846	.0893
.095	.0280	.0326	.0380	.0426	.0470	.0526	.0572	.0627	.0680	.0726	.0780	.0826	.0880
.100	.0267	.0313	.0366	.0413	.0466	.0513	.0566	.0613	.0666	.0713	.0766	.0813	.0866
.105	.0253	.0300	.0347	.0400	.0447	.0493	.0547	.0593	.0653	.0700	.0747	.0800	.0853
.110	.0240	.0286	.0333	.0386	.0433	.0480	.0533	.0580	.0633	.0680	.0733	.0780	.0833
.115	.0220	.0266	.0320	.0367	.0420	.0466	.0520	.0566	.0619	.0666	.0720	.0766	.0819
.120	.0206	.0253	.0306	.0353	.0406	.0453	.0506	.0553	.0606	.0653	.0706	.0753	.0806
.125	.0193	.0240	.0293	.0339	.0393	.0439	.0493	.0539	.0593	.0639	.0693	.0739	.0793
.130	.0180	.0230	.0280	.0326	.0380	.0426	.0480	.0526	.0580	.0626	.0680	.0726	.0780
.135	.0167	.0210	.0260	.0310	.0366	.0413	.0466	.0513	.0566	.0613	.0666	.0713	.0766
.140	.0153	.0200	.0253	.0300	.0353	.0400	.0453	.0500	.0553	.0600	.0653	.0700	.0753
.145	.0140	.0183	.0233	.0283	.0333	.0383	.0436	.0483	.0533	.0583	.0633	.0683	.0733
.150	.0120	.0166	.0220	.0266	.0320	.0366	.0420	.0466	.0520	.0566	.0620	.0666	.0720
.155	.0107	.0157	.0207	.0256	.0306	.0357	.0406	.0457	.0506	.0557	.0606	.0656	.0706
.160	.0093	.0140	.0193	.0240	.0293	.0340	.0393	.0440	.0493	.0540	.0593	.0640	.0693
.165	....	.0126	.0176	.0226	.0276	.0326	.0373	.0426	.0473	.0520	.0573	.0626	.0673
.170	....	.0106	.0160	.0206	.0260	.0306	.0360	.0406	.0460	.0506	.0560	.0606	.0660
.175	....	....	.0146	.0193	.0246	.0293	.0346	.0393	.0446	.0493	.0546	.0593	.0646
.180	....	....	.0133	.0180	.0233	.0280	.0333	.0380	.0433	.0480	.0533	.0580	.0633
.185	....	....	.0116	.0163	.0213	.0263	.0313	.0363	.0413	.0463	.0513	.0563	.0613
.190	....	....	.0100	.0146	.0200	.0246	.0300	.0346	.0400	.0446	.0500	.0546	.0600
.195	....	....	....	.0133	.0186	.0233	.0286	.0333	.0386	.0433	.0486	.0533	.0586
.200	....	....	....	.0120	.0173	.0220	.0273	.0320	.0373	.0420	.0473	.0520	.0573
.205	....	....	....	....	.0160	.0206	.0260	.0306	.0360	.0406	.0460	.0506	.0560
.210	....	....	....	....	.0146	.0193	.0246	.0293	.0346	.0393	.0446	.0493	.0546
.215	....	....	....	....	.0133	.0180	.0230	.0270	.0330	.0379	.0433	.0497	.0533
.220	....	....	....	....	.0120	.0166	.0220	.0266	.0320	.0366	.0420	.0466	.0520
.225	....	....	....	....	....	.0153	.0203	.0253	.0303	.0353	.0403	.0453	.0503
.230	....	....	....	....	....	.0133	.0186	.0233	.0286	.0333	.0386	.0433	.0486
.235	....	....	....	....	....	....	.0173	.0220	.0273	.0320	.0373	.0420	.0473
.240	....	....	....	....	....	....	.0160	.0206	.0260	.0306	.0360	.0406	.0460
.245	....	....	....	....	....	....	.0143	.0190	.0243	.0290	.0343	.0390	.0443
.250	....	....	....	....	....	....	.0126	.0173	.0226	.0273	.0326	.0373	.0426

BASIS ON WHICH ABOVE TABLE IS PREPARED

UNTREATED

2½ Cross ties	at 50c each =	$1.25
2½ Placing	at 25c each =	.63
		$1.88
Untreated	=	$1.88
Treated	=	1.33
		$0.55

TREATED

1 Cross tie	at 50c =	$0.50
1 Placing	at 25c =	.25
2½ Gal. creosote	at 10c = $0.25	
Tie plant expense	at 8c = .08	
		.33
Interest at 5 per cent per annum on 33c—15 years		.25
		$1.33

Total saving $0.55 ÷ 15 = $0.0366 per tie per year.

estimated that there are approximately 100,000 miles of passing tracks, yard tracks and spurs, on which about 2,800 ties per mile are used, a total of 280,000,000 ties. On a basis of six years' life untreated these tracks would require annual renewals of over 46,000,000 ties, making an approximate total of tie renewals for all tracks of 191,000,000. Changing these figures to board measure, and estimating main line ties at 38 ft. board measure per tie, they would represent 5,510,000,000 ft. board measure. Estimating yard, and passing track and spur track ties at 32 ft. board measure per tie, the requirements represent 1,472,000,000 ft. board measure, making a total for all tracks of 6,982,000,000 ft. board measure. This is only one item of the numerous drains on the forests by the railroads. In addition to this there are the demands for buildings of all kinds, bridges, wharves, docks and numerous structures in which large quantities of timber are used.

Assuming that the life of cross ties can be extended by the use of preservatives and proper tie plates to 15 years instead of 6, the requirements for main tracks would be reduced to 58,000,000 ties or 2,204,000,000 board feet, and for passing and other tracks to 20,000,000 ties or 597,000,000 ft. board measure annually, or a grand total of 78,000,000 ties or 2,801,000,000 board feet, making a total yearly saving of 113,000,000 ties or 4,181,000,000 ft. board measure for railroad cross ties alone.

The treating of cross ties with preservatives is not only a move in the interest of conservation, but it is economical for the users, as the table on the preceding page shows. It is prepared from experience in the treatment and use of Minnesota, Wisconsin, Montana, Idaho and Washington timber in railroad tracks in those states.

There are various other items of expense in connection with tie renewals which are not taken into account in this table, and which cannot very well be shown, owing to variable conditions. The originating points from which ties are shipped to the treating plants are different for almost every shipment, the more frequent disturbance of the roadbed for untreated ties, more especially when traffic and labor conditions are abnormal and the additional hauling and handling are typical. Therefore, if the table errs in any way it is in favoring untreated ties. With present processes of treatment large quantities of inferior species of timber, not suitable for general use in buildings or for ties untreated, can be used, such as birch, ash, elm, cottonwood, red oak and jack pine; timbers that will not last to exceed three years without treatment before decay will render them unsafe.

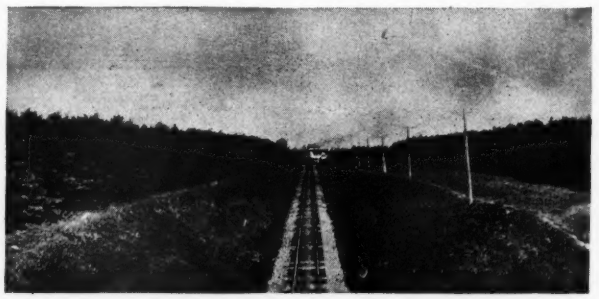
In the fall of 1907 and summer of 1908 the Northern Pacific treated quite a large number of cross ties of the above species (approximately 60,000) at Brainerd, Minn., with creosote oil and placed them in main line and branch tracks. They are giving very good service. To all appearances the red oak, birch, elm, cottonwood and jack pine will last for many years yet. The only sign of failing is caused by mechanical wear and splitting in some instances, but the general results are good. A large number of ties of these species have been used on this road each year since 1907. Red oak, birch and elm are much superior to our best grades, such as tamarack or fir for tie timber when treated with creosote owing to their susceptibility to treatment, resistance to mechanical wear and spike-holding qualities. Tamarack and fir are our most refractory timber to treat, but they can and are treated successfully, although in a few years the supply will have to come from Montana and west of there, as the eastern forests are beginning to show marked signs of depletion in what was considered an inexhaustible supply about 25 or 30 years ago.

EVERGREEN SNOW FENCES

THE CANADIAN Government Railways have resorted to the use of hedges or evergreen snow fences to protect the tracks against drifting snow in winter time. This style of snow protection has been found to be most effective and the maintenance cost is small as compared with ordinary wooden snow fences.

The hedges are installed on those sections of the line subjected to the worst snow troubles. These conditions occur on the Moncton, Dalhousie and Campvellton subdivisions. On the Moncton sub-division these fences extend in stretches from mile 121 to mile 185, the total mileage of the hedge being 12.21 miles. On the Dalhousie sub-division there is a total of 2 miles of hedge between mileage 0 to 6 and about 0.8 of a mile on the Campvellton sub-division in two stretches, one between miles 49 and 50 and one at mile 92. The total mileage of hedge on the system is approximately 15 miles. The excellent appearance is indicated by the illustration.

The first experiment with natural snow fences on this railroad were made about 30 years ago, the work being



A Typical Planting of Evergreens

carried on for several years by the section forces when time could be spared from their regular track work. When set out the spruce are small, ranging from 18 in. to 3 ft. high, and it takes from 6 to 7 years for them to grow high enough to make an effective barrier. When the trees reach a height of between 9 and 10 ft. the tops are trimmed off evenly and the side branches cut to give the hedge an even appearance. When first planted the wooden snow fences are left in place, but they are removed when the hedge has attained a height of about 4 ft. to permit the sunlight, air and moisture to get to the growing trees.

In most settled countries it is often necessary to erect a wire fence outside of the hedge to protect it while the hedge is growing. In such cases care is taken to place the fence at a clear distance from the hedge so that the branches of the trees will not whip against the wires. From experience it was found that about 75 ft. from the near rail of the track is the best distance to locate the hedges to prevent the drifts from reaching the tracks and in some cases the ends of the hedges are turned at right angles to prevent snow which drifts parallel to the track with the prevailing winds from blockading the ends of the cuts.

The hedges are protected against fire by burning off the dead grass under and around the trees as soon after the snow disappears in the spring as is possible. The fires are watched carefully to prevent them from getting into the trees.

The best results from planting are obtained by digging a trench about three feet wide and deep enough to accommodate the roots of the trees to be planted without crowd-

ing. The trench is prepared in advance of the digging out of the trees so that the moisture from the roots will evaporate as little as possible.

The trees are planted about two feet apart in line, staggering them alternately on opposite sides of the trench to gain room for the roots. The trench is dug deep enough to give the same depth of earth over the roots as the trees had in their original location. The roots are well spread and care is taken to see that they are not bunched or twisted.

Most of the trees are secured from the right of way or from farm land adjoining and as far as possible trees of the same size were planted together so that the hedge would grow uniformly. We are indebted for the above information to J. E. Long, safety engineer of the Canadian Government Railways.

Railway Men Play an Important Part in the War

SPECIFIC INFORMATION on the part which the railroad troops have taken in winning the war has been made available in the annual report of the Secretary of War, which was recently made public. The true importance of the transportation department in providing for the uninterrupted movement and supply of our forces in France was appreciated at the outset in the preparation of plans for sending an expeditionary force to France. Under the leadership of Major General W. M. Black, chief of engineers, a program of construction was prepared providing for the movement and supplying in France of not less than four million men. These plans included the development of water and railroad terminals at 16 French ports located from the English channel to the Mediterranean; the repair, expansion and maintenance of certain of the French railroads assigned to the use of our armies; the construction of narrow gage lines at the front; the organization of forces for the construction, maintenance and operation of railways and terminals; and provisions for an adequate supply of track materials, rolling stock and construction materials and equipment of all kinds. Orders placed up to November, 1918, on account of these projects amounted to $700,000,000, a sum five times as great as all the purchases of material, equipment and supplies made for the Panama canal.

Of this huge sum, about $400,000,000 is for American-built rolling stock, orders for which have been placed, as shown below:

ORDERS PLACED TO NOVEMBER 10, 1918, FOR ROLLING STOCK FOR THE AMERICAN EXPEDITIONARY FORCE

Type	Ordered	Cost	Shipped for France	Cost
Locomotives, standard gage....	3,541	$140,000,000	1,183	$ 50,000,000
Cars, standard gage.....	91,534	240,000,000	17,268	44,000,000
Locomotives, narrow gage.....	1,294	11,000,000	406	3,000,000
Cars, narrow gage.....	8,623	7,000,000	3,651	3,000,000
Total	104,992	$398,000,000	22,508	$100,000,000

In addition to the foregoing, 209 locomotives had been purchased at a cost of $11,000,000 for army use in this country.

For the construction of the railroad track that we have added to the French system to adapt it to our needs, and for the military and lumbering roads that we have constructed, the General Engineer Depot had ordered up to November 1 sufficient rail to lay 7,500 miles of track. Nearly half of this amount has already been shipped abroad and the schedule of shipment in force at the time the armistice was signed called for the monthly shipment of material for about 600 miles of new track. In addition, enough rail for about 1,000 miles of narrow-gage track has been shipped for the construction of the 60-cm. lines close behind the trenches, used for traffic in these sections.

The cessation of hostilities has, of course, rendered unnecessary the completion of our expeditionary project, and steps have been taken to reduce orders and cancel contracts for such items as will not be needed in France. In this connection, however, care is being taken to assure ourselves that we are not depriving France of material which she so urgently needs to replace that worn out during her terrific self-denials of the past four years. We cannot refuse to render all the assistance possible in the reconstruction of that heroic nation.

As the work on these huge projects took form, it was apparent that a separate organization must be created within the engineering department to handle the transportation problem. Accordingly, the office of director general of military railways was established and Samuel M. Felton, president of the Chicago Great Western, was appointed to the position. His intimate knowledge of railroad problems, coupled with a personal trip of inspection over all our lines of communication in France, have rendered his advice particularly valuable and have greatly facilitated the progress of the war department in these particulars. The immediate responsibility of the work in France was instructed to Brig. Gen. W. W. Atterbury, formerly vice-president of the Pennsylvania Railroad, who was appointed director general of transportation and who, with his able staff, has succeeded in transporting our troops and their supplies over the 500 miles of railroad from seaboard to battle line with remarkable efficiency and despatch.

The director general of military railways has performed two principal functions—that of purchasing transportation equipment, such as cars, locomotives, cranes, tugs and barges, and that of securing personnel for the transportation department of our army in France. Within a month after the declaration of war, a beginning had been made of recruiting the railway regiments, which are made up almost entirely of men formerly employed by the railways of the United States. At the present time the number of these men in service in France is nearly 60,000. They are organized and trained as military units, in companies, battalions and regiments, and these units are designated by different titles, indicating the general nature of the services they are to render, such as standard-gage railway operating regiments, standard-gage railway shop regiments, light railway construction regiments, railway operating battalions and locomotive-repair battalions.

Each of these units is made up of men skilled in many different trades or crafts. About 1,800 of these troops are officers, among whom are railway superintendents, superintendents of motive power, assistant division superintendents, train despatchers, master mechanics and division engineers. The removal of so large a number of skilled men from the service of the railroads of this country at a time when they were obliged to operate at an intensity never before equaled, seriously increased the difficulties under which they labored.

The report also shows that in the 19 months elapsing from the declaration of war to the signing of the armistice the army created an embarkation service which succeeded in shipping overseas 2,075,834 men and 5,153,000 tons of cargo. In the last 10 months the army embarked

1,880,339 men and shipped 4,660,000 tons of cargo. Included in the cargo shipment were 1,145 Consolidation locomotives of the 100-ton type, of which 350 were shipped set up on their own wheels, so they could be unloaded onto the tracks in France and run off in a few hours under their own steam. It is stated that shipments of set-up locomotives of this size had never been made before. Special ships with large hatches were withdrawn from the Cuban ore trade for the purpose, and the hatches of other ships were especially lengthened so that when the armistice was signed the army was prepared to ship these set-up locomotives at the rate of 200 a month. The army also shipped 17,000 standard-gage freight cars and at the termination of hostilities was preparing to ship flat cars set up and ready to run. Rails and fittings for the reinforcing of French railways and for the construction of our own lines of communication aggregated 423,000 tons.

The report of General Pershing to the secretary of war also pays a high tribute to the work of the Engineer Corps, which includes the railway activities, saying that "the work has required large vision and high professional skill, and great credit is due the personnel for the high proficiency that they have constantly maintained." The report says that the eventual place the American army should take on the western front was to a large extent influenced by the vital questions of communication and supply. "Constantly laboring under a shortage of rolling stock," General Pershing said, "the transportation department has, nevertheless, been able by efficient management to meet every emergency."

The report of the chief of staff of the army says that during the fiscal year 5,377,468 officers and men were moved by railroad to and from camps in this country.

The report of the Board of Ordnance and Fortification to the secretary of war refers to the allotment of the sum of $74,000 for the development, construction and test of a railway car propelled by 200 hp. oil engine with electric drive, fitted with an armored cab, searchlight and conning tower and carrying a normal armanent of two machine guns. The construction of the car is nearing completion and it is expected that tests will be conducted in the near future. On August 19, 1916, the board made an allotment of $4,500 for the construction and test of a railroad flat car mounting a seven-inch howitzer, and on May 4, 1917, $7,000 additional was made available for this purpose. The car and mount has been completed and delivered and the tests will shortly be conducted.

Filters Will Improve Locomotive Water Supplies

BY C. P. VAN GUNDY,
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IN THE VARIOUS articles which have been published on the subject of water supply and water treatment, there is one phase of the subject that is not given the prominence it deserves. We see frequent figures on the soluble scale-forming solids, the effects of scale, its cost and the methods of preventing and removing it, but little mention is made of suspended matter or, in plain words, mud. Fine silt, of course, is often deposited and held on the tubes and sheets as part of the scale, as is readily determined by examination and analysis, but where mud is present in large quantities in the water supplied to the boiler, besides increasing the tendency to foam, it is thrown down as sludge, and, together with the loosened scale, settles to the portions of the boiler where circulation is least active. If it is not then removed speedily, mud burns follow, resulting in leaks, buckling of the sheets and the letting down of staybolts.

A curve showing the frequency of mud burns would have its high points in the freshet season. The rivers of the middle west carry five or six pounds of suspended matter per thousand gallons during high water periods, which means that a locomotive may take into its boiler 100 to 120 lb. of mud on one trip. As an extreme case an analysis of a small stream supply at a dispatching point showed 10 lb. of suspended matter per 1,000 gal. of water, indicating that each locomotive sent out was given 70 to 90 lb. of mud in its tank.

To counteract the addition of mud frequent washing of the boilers is necessary, and even then mud burns occur with greater or less frequency. I recall an instance of 16 failures in one month in one district because of mud, with the consequent loss of time and damage to the boilers. If we assume two days out of service as the average result of a mud burn and $50 per day as the net earning value of a locomotive, we have $1,600 loss for the month for lost time only in the above case, without including the cost of labor and material for repairs.

The following aggravated case came under my notice last winter. A Mikado locomotive just out of the shop was put in service on a division where the water was of fair quality and was run one month. Because of a thaw the streams became muddy and on the third day of the month, the boiler was burned and the engine sent to the shop. She was in the shop three days; 28 staybolts were renewed and the boiler washed. On the seventh of the month it reached the other end of the division, where it was again shopped for two days, the boiler washed and 23 bolts renewed. We have, then, as a result of one mud burn, 51 staybolts renewed and five days out of service. Taking the net earning value of a locomotive as before and including the cost of material and labor, extra boiler washing and extra firing up, we have very close to $400 as the cost of this one mud burn. If we take the gross income from the use of the locomotive as a basis, the loss would be about $900 at the time of the occurrence, and, for a like occurrence now, more than $1,000.

In another case, a locomotive was dispatched after being given water from the small stream above mentioned. Water was taken at two or three points from a muddy river, and a mud burn resulted before the engine had reached the end of its run. Something over one hundred staybolts had to be renewed and the locomotive was out of service four days.

Instances could be multiplied. It can be said that mud burns occur frequently enough to be a serious hindrance to economical operation, and any means that can be taken to prevent them are worth consideration and adoption. Some of our operating friends will tell us that the cure is to wash our boilers more often, but that is not always feasible; it costs money for labor, water and fuel, puts more or less strain on the boiler, and keeps the locomotive out of service. Boiler compounds do not cure, in fact, they often aggravate the trouble, so that the only thing left is the rational one of removing the mud before feeding the water to the boiler. When the mud is very heavy, most of it can be removed by allowing sufficient

time for it to settle in the tanks and using a float pipe for drawing off the partially cleared water from the top, but obviously the better way is to take it all out by filtration or by filtration and treatment in specially constructed plants.

It might be observed that there are few instances where it would be advisable simply to filter the water. Most turbid waters carry, in addition to the suspended matter, certain removable quantities of scale-forming solids in solution, and a plant to remove these along with the mud would cost very little more to install than one for the removal of the suspended matter alone.

Taking as an example again the rivers of the middle west, we find that they average 1 to 1½ lb. of suspended matter per 1,000 gal. throughout the year, with the above mentioned 5 or 6 lb. maximum, while the incrusting solids average 2 lb. per 1,000 gal., with a maximum of 3½ to 4 lb. It is evident in this case that the incrusting solids can be reduced to ¾ lb. or less per 1,000 gal., at the same time that all of the suspended matter is removed.

This method has the further advantage that in treating to reduce hardness or scale-forming solids, a more or less flocculent precipitate is formed, which tends to collect the suspended matter, the whole settling readily. This method also generally renders unnecessary the addition of alum or other coagulant, which must be used when filtration alone is employed and which tends to cause the formation of a harder scale in the boiler.

Enough has been said to call attention to the damage that may result from the use of turbid waters. It is highly desirable to eliminate any condition that calls for the expenditure of labor, the use of material, and lessens in any way the service or mileage we get out of our locomotives, when we need every pound of power we can get for the transportation of our soldiers and war material.

RAILWAY STATISTICS FOR 1917

THE BUREAU of Railway News and Statistics, Chicago, has issued an annual report of railway statistics for 1917. The statistics cover reports from 485 roads, operating 252,029 miles of line and 392,350 miles of all tracks. The equipment for these roads on December 31, 1917, is given as locomotives 63,828, passenger cars 54,779, freight cars 2,384,705 and company cars 125,051. The investment in equipment alone at 1909 prices is computed to be $4,844,056,000.

The average number of railway employees in 1917 was 1,780,235, whose compensation aggregated $1,781,027,000, or over $1,000 per man yearly. Between 1907 and 1917 the number of employees increased 10.8 per cent and their compensation 66.1 per cent. The Adamson law and incidental changes in conditions of employment added approximately $201,000,000 to the yearly railway pay roll. The advances under federal control will add something like $750,000,000 to the 1917 figures. The payroll in 1917 absorbed 43.71 per cent of the operating revenues.

The gross capitalization of these roads is computed to be $20,072,730,672 and the net capital after deducting intercorporate investments $16,823,695,000, or $66,755 per mile operated, or $69,983 per mile after deducting mileage operated under trackage contracts. The investment in these roads to December 31, 1917, less accrued depreciation, was $18,400,886,812.

Federal valuation to December 31, 1917, had cost the United States $8,867,073, and the railways $20,578,415, a total of $29,435,120, or more than three times the cost of production, new, of the only roads whose valuation has been confirmed so far.

SANITARY REGULATIONS

SANITARY REGULATIONS for the government of maintenance of way employees in the care of section houses and boarding cars on the Nashville, Chattanooga & St. Louis have been prepared by Hunter McDonald, chief engineer, and Theo. Speiden, Jr., assistant general manager, and have recently been placed in effect. These regulations are as follows:

HEALTH AND WELFARE OF MEN: Officers and employees must take all possible precautions and be constantly on the alert to protect the health and welfare of the men and their families on the premises of the company. Frequent inspections of boarding cars, camps and section houses and premises must be made.

Officers and foremen must keep informed about State and Municipal laws and regulations for the preservation of health and will be held responsible for failure to observe same.

DANGEROUS DISEASES TO BE REPORTED: Report at once to the superintendent, by wire, all cases of disease occurring in boarding cars or section houses, which may appear to be of a dangerous and infectious character.

DRINKING WATER: Supervisors and foremen must look carefully after the quality of the drinking water. The fact that water is clear and sparkling is no guarantee against pollution. Keep surface drainage out of wells and springs. Report to the division engineer cases of typhoid or scarlet fever among employees or neighbors who use drinking water from the same source. The division engineer will arrange for testing suspicious waters. Sources which are condemned, if on company property, must be made inaccessible, and if on private property, avoided. Prompt and vigorous steps must be taken to provide pure water for convenient access and use.

PRIVIES AND REFUSE: Permanent and temporary privies must be located so as to drain away from the houses, cars, wells and springs. Ditching must be resorted to when necessary.

SEPTIC TANK PRIVIES: Septic tank privies will be provided in lieu of dry closets as rapidly as circumstances will permit and these must receive the requisite amount of water daily.

DRY CLOSETS: These must be provided with boxes or tubs, be cleaned out at frequent intervals and the contents disinfected and buried, and kept screened against flies, with holes covered.

WATER CLOSETS: Leaks must be stopped at once and any breaks in seats or apparatus promptly repaired.

USE AND CLEANLINESS OF PRIVIES: Privies must be kept clean and provided with standard toilet paper and holders. Persons must be forced to use them properly and promiscuous defecation prevented as far as possible. This is the direct cause of hookworm and the indirect cause of other diseases. Wherever it occurs require men to cover with ashes or lime.

PORTABLE DRY CLOSETS: These must be set up at once wherever boarding and camp cars are stopped for a stay of more than three days, and when the company's permanent facilities are not accessible. These must be made according to standard plan, pits must be provided and the contents disinfected daily and buried weekly or oftener if necessary.

GARBAGE: See to it that as little is made as possible. Encourage the keeping of pigs to consume what there is. Arrange with neighbors to feed it to their pigs. Where this cannot be done, provide tight receptacles and bury or burn it before it putrifies. Keep it disinfected.

FLIES AND MOSQUITOES: Both carry disease and must be avoided, the former typhoid fever, the latter malaria.

Kitchen and dining rooms must be screened tight and fly poison and swatters used constantly.

SCREENS: Must be attached to frames and painted every two years with thin carbon black, and removed and cared for during the winter months. Door and window screens, poison fly paper and swatters will be furnished for section houses and boarding cars on requisition.

DRAINAGE: Drain all standing water or put crude oil in it once every two weeks. Melt the bottoms off of tin cans before throwing them out. Keep old bottles under shelter and empty. If rainwater barrels must be used, cover them tight and empty at least every two weeks. Wiggletails make mosquitoes.

SUNLIGHT AND VENTILATION: Vermin are filthy and cause disease. Eternal vigilance is necessary in order to avoid them. Sunlight is a powerful disinfectant. All beds and clothing should be sunned twice each week. Lack of ventilation is the prime cause of tuberculosis. Keep doors and windows open day and night when weather permits.

DISINFECTANT: The company furnishes Standard Disinfectant Coefficient No. 2, which comes in cans. Use it as per directions on containers. Apply it daily to seats and bowls of water closets and urinals and to wash basins. Use it in water with which floors are mopped. Clean cuspidors with it daily and leave them half-full of water with teaspoonful of disinfectant added. Where boxes of sawdust are used, empty them and refill frequently, adding a little lime. Allow no spitting on the floor or around stoves. Clean and disinfect all floors which have been expectorated upon.

WOOD PRESERVING AND TIE MEN WILL MEET IN ST. LOUIS

THE FIFTEENTH Annual Meeting of the American Wood Preservers' Association will be held at the Hotel Statler, St. Louis, on January 28 and 29, 1919. The Tie and Timber Division of the St. Louis Chamber of Commerce has called a meeting of the tie producers of the country for the two following days to perfect a national organization. These meetings will bring together in convention in the same city and in the same week the users and the producers of crossties. Advantage has been taken of this fact to correlate the programs of the two associations. The meeting of the American Wood Preservers' Association has been curtailed to two days with three sessions on Tuesday and two on Wednesday, concluding with a joint dinner with the National Tie Producers' Association on Wednesday evening, at which it is expected that one of the officers prominent in the United States Railway Administration will be the speaker. The session on Tuesday evening will be devoted to the consideration of the preservative materials situation. Wednesday afternoon will be given over to the consideration of the tie problem.

The program for the convention of the American Wood Preservers' Association is as follows:

TUESDAY, JANUARY 28

10 a. m.

Opening Exercises
Committee Report—Publications.....John Foley, chairman
Committee Report—Promotion and Education.....
.....Carl G. Crawford, chairman
Committee Report—Terminology.....Wm. A. Fisher, chairman

2 p. m.

Committee Report—Plant Operation....W. H. Grady, chairman
Fuel Economies.....By Jos. W. Hays, combustion engineer
Committee Report—Service Tests, Flooring and Paving..
.....A. W. Dow, chairman
Committee Report—Wood Block Flooring and Paving....
.....Walter Buehler, chairman
Committee Report—Preservatives.....E. B. Fulks, chairman
Marine Wood Preservation.....By Dr. L. F. Shackell
The Timber Treating Plant Chemist.....By C. Marshall Taylor

7:30 p. m.

The Sodium Fluoride Situation.....By Galen Wood
The Zinc Chloride Situation.....By J. H. Jordan
The Creosote Oil Situation.....
.....By representative manufacturers and importers
The Transition from Creosote Oil to Zinc Chloride in the Treatment of Cross Ties..By Dr. Hermann Von Schrenk

WEDNESDAY, JANUARY 29

10 a. m.

Committee Report—Purchase and Preservation of Treatable Timber.....H. S. Sackett, chairman
Committee Report—Non-Pressure Treatments.....
.....R. A. Griffin, chairman

2 p. m.

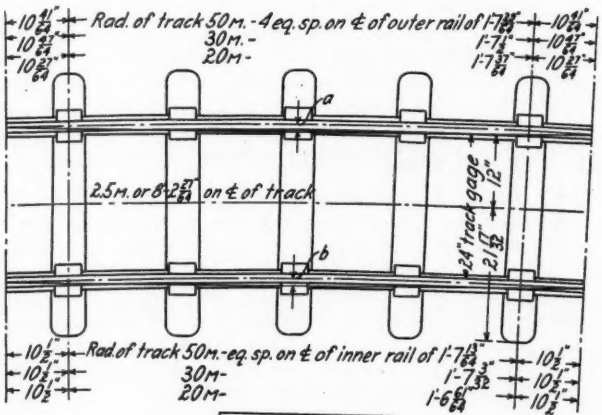
The Car Situation..By E. H. DeGroot, Jr., assistant manager, car service section, U. S. Railroad Administration
Committee Report—Service Tests, Ties and Timber.....
.....J. H. Waterman, chairman
Development of Uniform Practices in Procuring and Preserving Cross Ties.....
.....By John Foley, associate manager, forest products section, U. S. Railroad Administration

6:30 p. m.

Annual Dinner—Jointly with National Tie Producers' Association.

TRACK WORK FOR PORTABLE MILITARY RAILWAYS

WHILE IT HAS been generally known that our troops in France used 60-cm. (2-ft.) gage portable track as the outer extremities of the lines for communication between the supply bases and the trenches, very little detailed information has been available concerning the exact nature of the track used. In view of this the accompanying drawing, showing a curved section of portable track, is of interest. The track consists of 25-lb. rail secured to pressed steel ties. The rails are of A. S. C. E. section punched for standard angle bars and bolts. To facilitate rapid laying and removal, the track is made up in sections, in three different lengths, for straight track and of three different radii of curved track. The sections come in lengths of 5 m. (about 16 ft. 5 in.), 2½ m. (about 8 ft. 2¾ in.) and 1.25 m. (about 4 ft. 1¼ in.). The 5-m. section has 8 ties, the 2½-m. 5 ties and 1¼-m. 3 ties. The same arrangement is used for the curved track, except that the 5-m. section has 9 ties.


Rad. of track 50m. - 4 eq. sp. on ℄ of outer rail of 1'-7 33/64"
30m. -
20m -
a
2.5m. or 8'-2 27/64" on ℄ of track
b
24" track gage
12"
2 17/32"
Rad. of track 50m. - eq. sp. on ℄ of inner rail of 1'-7 33/64"
30m -
20m -
1'-7 3/32"
1'-6 6/64"

	a	b
50m Rad.	0 38/64"	0 38/64"
30m "	1 3/32"	1 1/64"
20m "	1 8/16"	1 33/64"

Details of the 2½-Meter Track Sections

The curved sections were provided for radii of 50 m. (164 ft.), 30 m. (97.5 ft.) and 20 m. (66 ft.). As shown on the drawing, the rails of the curved sections were cut to give the square ends to the section. The ties are 1.25 m. long, or 4 ft. 1¼ in.

THE MATERIAL MARKET

THE TRANSITION from a war to a peace basis in the material market is taking place rapidly. After the first of the year only a vestige of the price fixing by the War Industries Board will remain. Control of steel prices virtually ends on January 1, as is the case also with respect to prices on Southern pine and New England spruce, while the maximum prices on Douglas fir logs and lumber will be discontinued January 15.

A peculiar situation holds with respect to the steel market. When the War Industries Board announced that it proposed to discontinue the control of prices the first of the year, the manufacturers advanced a plan for a continuation of price control, but with a moderate reduction in the prices of some materials. Just how this plan will work out is not known at this writing. It is understood, however, that the changes proposed include reductions of $3 on pig iron and $5 on plates and structural shapes. In fact, some reductions have already been made. In the quotations listed below all those marked with an asterisk indicate reductions from the War Industries Board schedule:

	Price Per 100 Lb.	
	Pittsburgh	Chicago
Bars	*$2.70	$3.17
Plates	*3.00	*3.27
Shapes	*2.80	3.27
Angle Bars	3.25	3.25
Track Spikes	*3.70	*4.915
Track Bolts	*4.70	5.115
Barb Wire, Galvanized	4.35	.....
Wire Nails	3.50	.....
Boat Spikes	5.25	.....
Tie plates, steel	3.25	3.25
Tie plates, iron	3.75	3.75
C. I. Pipe, 6 in. or larger (per ton)		66.80

The price of rail still remains unsettled, as the Railroad Administration did not reach any agreement with the War Industries Board during the time that that body was concerned with price fixing. The figures of $55 per gross ton for Bessemer rail and $57 for open hearth rail still remain the nominal prices, although they cannot be said to mean very much, as almost no orders are being placed.

In the case of scrap the government fixed prices have ceased to be of any importance for some time, since these prices, being maximum prices, have not prevented the quotations from falling below those established. Current quotations on scrap material of interest to the maintenance of way department are given below:

	Prices Per Gross Ton		
	Pittsburgh	Chicago	St. Louis
Rails, relaying		$50-$55	$45 -$50
Rails, rerolling	$32	28- 29	27 - 27.50
Rails, scrap		30- 31	26 - 26.50
Frog and switch scrap cut apart		23- 24	24.50- 25
	Prices Per Net Ton		
No. 1 railroad wrought	$30-32	25- 26	$23 - 25.50
Steel angle bars		24- 25	23 - 23.50

Just what turn prices will take following the resumption of normal market conditions free from any government control, is, of course, problematical. One thing is certain and that is that the demand for materials will be appreciably less, for the War Department alone has announced that cancellations of contracts under its control will accomplish a saving of $7,000,000,000. Cancellations in the Emergency Fleet Corporation work are also of interest with respect to their probable influence on the lumber market. Whether or not this will have any appreciable effect on prices, it will surely improve conditions as regards supply and delivery. Since the inception of the work of this corporation 367 ships have been launched, 193 others have been started and additional contracts have been let for 171 upon which no work has been done. Of the latter, 48 contracts have been cancelled and cancellations are authorized on 100 others. This means that the wooden ship program will be virtually finished with the completion of the ships now under construction. Large stores of lumber intended for cantonment extension work are now available for disposal.

EDUCATE SECTION MEN

BY W. H. GRUHLKEY

Roadmaster and Master Carpenter Chicago, Rock Island & Pacific, Amarillo, Tex.

IT TAKES BRAINS even to handle a shovel right. The average foreign laborer without previous track work is bound to be clumsy or awkward in the handling of the shovel, tamping bar, and many other track tools. This awkwardness not only slows up his work but tires him out quicker and reduces his strength, which makes the day longer and work more discouraging to him, and a little crowding on the foreman's part will make the man decide that his time will be short on that particular job.

These things being true, it is the proper thing and important for the foreman to teach his men the proper way to handle the shovel and other tools, as well as the handling of ties and rails. Most "old-timers" know how these things are slighted, but they are very important in order to conserve the energy of the man and make every move count. Unfortunately, some foremen seem to have an idea that a "Bohunk" doesn't know much and never will, and seem to be satisfied to "cuss" their clumsiness rather than to help them overcome it. Such men always have discontented gangs, who soldier at every chance and will quit him at the very slightest provocation.

Because a man has been graduated to the rank of section foreman does not mean that it is beneath his dignity to take the shovel from a well meaning but awkward man, and show him the trick. If he is the right sort of a fellow for the job he can do this and still retain the respect of his men. The section foreman who patiently trains his men to do their work right makes his own work easier, for, naturally, laborers who know what they are doing and know how to do it will need less watching than a lot of men who haven't the least idea of the purpose of the work they do, and have never been shown how to do it right. Not until a section foreman demonstrates his ability to train his force and organize its activities for greatest results does he put himself in line for promotion. The plan of standing around with his hands behind his back or smoking his pipe and reading a newspaper gives men no encouragement and things won't go as they should. Most men would rather see themselves and accomplish good work and lots of it. If the foreman can and will try to educate the inexperienced men the results will be gratifying. I have never forgotten how my father showed me how to take hold of a tie to unload it out of a box car, and I have taught hundreds the same trick.—*Rock Island Employees' Magazine.*

GENERAL NEWS DEPARTMENT

The largest city ticket office in the world is the consolidated ticket office at Chicago, operated by the Railroad Administration for all the steam railroads entering the city. The aggregate monthly sales amount to over $2,000,000 and 175 people are employed in this combined office.

Th Canadian Northern, the control of which has been taken over by the Dominion of Canada, has been consolidated with the other roads owned by the Canadian government to form a single railway system aggregating about 14,000 miles, extending from Sydney, N. S., to Vancouver, B. C.

The Railroad Tie Producers' Association have been again compelled to postpone its meeting because of a renewed outbreak of influenza. The meeting will probably be held at St. Louis the fourth week in January in connection with the convention of the American Wood Preservers' Association.

The city of San Francisco has built a railroad 68 miles long, which will be used in the construction of the Hetch Hetchy reservoir dam, being part of a project for a new water supply for that city. This is believed to be the first steam railroad of any considerable extent to be built and also operated by a municipality.

The fifth annual meeting of the Railway Fire Protection Association took place at the Hotel Sherman, Chicago, on December 3, 4 and 5, with an attendance of nearly 200. This was the first meeting of this association since the inauguration of government control and the unification of railway fire protection work under the Fire Loss and Protection section of the Railroad Administration.

The Illinois Central has saved over $100,000 in the cost of water purchased from cities, exclusive of that pumped at its own stations during the last three years. A recent comparison of bills for water at 24 points where the consumption is in excess of $100 per month (representing 80 per cent of the total expense for city water in 1914, 1915 and 1916) showed a saving of $84,916 in the last two of these years after making adjustments on amount of changes in rates, etc.

The women employed by the railroads, according to Pauline Goldmark, manager of the women's section of the United States Railroad Administration, numbered approximately 100,000 on October 1. This was an increase of approximately 40,000 over the number in the employ of the railroads on January 1, 1918. On July 1 the number was about 81,000, of which 61,000 were working as clerks, stenographers, accountants, etc. The rest were doing manual labor, including a considerable number on track work.

The Mississippi Supreme Court in the case of the Yazoo & Mississippi Valley in a recent decision contends that where drainage of land is obstructed by a railroad embankment, the owner is not entitled to recover damages sustained by himself and his tenants and share croppers. Damages cannot be assessed where construction of culverts will obviate the obstruction on the theory that the cause thereof will permanently continue, but the owner must bring successive suits for damages as his crops accrue.

The demobilization of railway engineers is being accomplished as rapidly as possible. While many of the railway forces abroad will undoubtedly be required there for some time, certain units have been assigned to early convoys for return to this country, according to an announcement by General March, chief of the staff. He included 38,000 men in railway engineers and special units as among the troops designated. S. M. Felton, director-general of military railways, has resigned and hopes to return to Chicago soon.

The National Safety Council, W. H. Cameron, general manager, Chicago, has prepared a colored calendar entitled "The World's Greatest Chance-Taker," for use by manufacturers, railways and others in advocating safety first among employees during the coming year. During 1918 150,000 copies of this calendar were distributed. Common safety warnings, such as those to keep fingers away from buzz saws, to avoid stepping on nails, to be careful with matches, etc., are presented vividly by 12 illustrations, one for each month, in which the late Kaiser Wilhelm is the main figure.

In the list of firms to whom space had been allotted for the 1919 Annual Exhibit of the National Railway Appliances Association, published in our December issue, page 422, the name of the Ramapo Iron Works, Hillburn, N. Y., was omitted. This company was allotted space at the same time the other firms received their allotment and should have appeared in the original list.

NINE MONTHS OF FEDERAL CONTROL

The railway operating ratio (including taxes) for the nine months ending September 30, 1918, was 85.29 per cent, as compared with 75.41 per cent for the same period of the preceding year, according to data compiled by the Bureau of Railway News and Statistics, Chicago. In spite of an increase in operating revenues of nearly $560,000,000 in 1918, net income decreased approximately $212,000,000. This was brought about by an increase of approximately $780,000,000 in expenses, including increases in wages. Although the amount of money expended for the maintenance of the roadway and equipment is greatly in excess of that of a year ago, the properties have not been maintained to their normal standards and if this work had been done the decrease in operating income would have been still larger.

RAILROADS BEHIND IN LUMBER PURCHASES

At a meeting of the National Lumber Manufacturers' Association, held at Chicago on November 22, Edwin B. Parker, priorities commissioner of the War Industries Board, stated that normally the railways use approximately 1,250,000,000 ft. b. m. of lumber yearly for car construction alone. Since the beginning of the war their consumption of lumber has fallen below normal; in fact, the railroads are nearly four years behind their regular program for improvements, additions and extensions. Much of this work cannot be longer postponed and should be taken care of immediately. The Railroad Administration originally authorized $1,002,500,000 for additions and betterments on railroads during the year 1918 and only a little over 34 per cent of this had been expended up to November 1. These improvements are now urgently needed and it is believed that they will be made promptly now that labor and materials are available. Among the important railroad terminal projects that have been deferred on account of the war are those at Chicago, Los Angeles, St. Paul, Cincinnati, Baltimore and New York.

REPORT OF THE POSTMASTER GENERAL

The annual report of the postmaster general, A. S. Burleson, gives the surplus of receipts over expenses for the year ending June 30, 1918, as $19,979,798, an amount far larger than any similar previous surplus. The gross revenues of the department for the year from all sources are given as $388,975,962, or about $59,000,000 greater than in the preceding fiscal year. The postmaster general reiterates his recommendation that all telegraph and telephone lines should be owned and operated by the government. He states that experimental control during the war has demonstrated the correctness of his opinion in this matter.

Airplane mail service also forms an important part of the report. Airplane service between New York and Washington, 224 miles, has been maintained since May 5 and an average of 7¾ tons of mail matter is being carried each month. Additional aerial lines are proposed between New York and San Francisco, Boston to Key West, via Havanna to Panama and Key West via West Indies to South America, with several branch lines from these main routes. A number of airplanes of various types have recently been turned over to the postoffice department by the War Department.

Organization of the United States Railroad Administration

Exports Control Committee
605 Southern Ry. Bldg.
GEORGE D. OGDEN, Chairman
Major-General G. W. Goethals
Rear-Admiral C. J. Peoples
P. A. S. Franklin
D. W. Cooke
R. L. McKellar, Secretary

Division of Law
621 I. C. C. Bldg.
JOHN BARTON PAYNE, General Counsel
Charles B. Eddy, Asst. Gen. Counsel
R. Walton Moore, Asst. Gen. Counsel
Nathan Matthews, Special Assistant
Frank W. Gwathmey, Asst. to Gen. Counsel
W. G. Wheeler, Special Assistant
A. P. Humburg, Special Assistant
Frank C. Abbott, Asst. to Gen. Counsel
F. P. Smith, Asst. to Gen. Counsel
Carl A. Mapes, Asst. to Gen. Counsel
James W. Carmalt, Asst. to Gen. Counsel
Paul Dulaney, Asst. to Gen. Counsel

Claims and Property Protection Section
Southern Ry. Bldg.
JOHN H. HOWARD, Manager
W. J. Flynn
Chief of Secret Service
Phillip J. Doherty, Counsel
Property Protection
Charles F. Patterson
Counsel for Claims

Forest Products Section
701 So. Ry. Building
M. E. TOWNER, Manager
John Foley, Assoc. Mgr.
C. O. Deabler, Asst. Mgr.
J. H. Lauderdale, Special Representative, New Orleans, La.
O. H. Wood, Special Representative, Seattle, Wash.

Division of Finance and Purchases
619 I. C. C. Building
JOHN SKELTON WILLIAMS
Director
D. C. Porteous, Assistant

Purchasing Section Advisory Committee
704 Southern Ry. Bldg.
HENRY B. SPENCER, Chairman
Samuel Porcher
George G. Yeomans
William W. Morris, Secretary

Procurement Section
H. C. Pearce
John E. Mahaney
District Managers
J. G. Stuart, Chicago, Ill.
W. A. Hopkins, St. Louis, Mo.
Oscar V. Daniels, Pittsburgh
W. P. Jones, West Albany, N. Y.

Stores Section
601 G St.
E. J. ROTH, Manager
U. K. Hall, Assoc. Mgr.

Fuel Distributor
601 G St.
B. P. PHILLIPPE

Treasurer
Charles A. Lutz
402 I. C. C. Bldg.

Finance Section Advisory Committee
614 I. C. C. Building
FRANKLIN Q. BROWN, Chairman
Festus J. Wade
Frederick W. Scott
James N. Wallace

Marine Insurance Section
W. C. DELANOY, Manager
615 I. C. C. Bldg.

Fire Loss and Protection Section
718 18th St.
CHARLES N. RAMBO, Manager

Advisory Committee
Theodore H. Price*, Chairman
R. M. Bissell D. R. McLennan
Charles E. Mather A. M. Schoen
*Resignation effective Jan. 1.

Division of Capital
603 I. C. C.
ROBERT S. LOVET
E. E. Adams, Engine
F. W. Sercombe, Ac
*Resignation effective

Traffic Representatives in Government Departments
H. M. Adams, Manager Inland Traffic, War Dept.
H. P. Anewalt, Manager Inland Traffic, Navy Dept.
Manager Inland Traffic, Shipping Board
C. E. Spens, Manager Inland Traffic, Food Administration
F. M. Whittaker, Manager Inland Traffic, Fuel Administration
J. A. Middleton, Manager Inland Traffic, Petroleum Section, Fuel Administration
T. C. Powell, Manager Inland Traffic, War Industries Board

Eastern Region
A. H. SMITH, Regional Director
Grand Central Terminal, New York
Martin J. Alger, Exec. Asst.
H. W. Burnham, Exec. Ch. Clerk
A. T. Hardin, Asst. Reg. Dir.
H. L. Ingersoll, Mechanical Assistant
W. G. Curran, Sp. Agt. Trans.
Francis La Bau, Traffic Assistant
G. H. Ingalls, Res. Traf. Asst., Chicago
E. C. Keenan, Gen. Supt., Telegraph and Telephone

Regional Purchasing Committee
S. B. WIGHT, Chairman
A. W. Munster
W. G. Phelps

Budget Committee
New York City
F. L. STUART, Chairman
A. T. Hardin
A. C. Shand
H. A. Lane

G. C. WOODRUFF, Chairman
Sailing Day Plan Committee

W. B. POLLOCK, Marine Director
New York Harbor
Grand Cent. Term., New York

E. J. Henry, Supervisor
Rail and Lake Traffic
Eastern and Allegheny Regions
Buffalo, N. Y.

North Atlantic Ports Freight Traffic Committee
141 Broadway, New York
ROBERT L. RUSSELL, Chairman
Richard Van Ummerson
Archibald Fries
Elmore D. Hotchkiss
Joseph R. Ruffin
W. A. Moore, Secretary

Allegheny Region
C. H. MARKHAM, Regional Director
Broad Street Sta., Philadelphia, Pa.
M. P. Blauvelt, Asst. Reg. Dir.
L. W. Baldwin, Operating Assistant
C. R. Capps, Traffic Assistant
J. B. Fisher, Transportation Assistant
Mechanical Assistant
E. B. Temple, Engineering Assistant
L. D. Shearer, Supervisor Tel. & Tel.

J. R. KEARNEY, Chairman
Sailing Day Plan Committee

Regional Purchasing Committee
E. H. BANKARD, Chairman
J. D. Landis

New England District
J. H. HUSTIS, District Director
South Station, Boston, Mass.
P. R. Todd, Assistant to District Director, Bangor, Me.

Central District
A. T. HARDIN, District Director
Grand Cent. Term., N. Y.

Ohio-Indiana District
H. A. WORCESTER, District Director
721 Union Central Bldg., Cincinnati, O.
Hugh McVeagh, Executive Assistant

Board of Wages and Working Conditions
812 So. Ry Bldg.
G. H. SINES, Chairman
F. F. Gaines, Vice-Chairman
J. J. Dermody — W. E. Morse
C. E. Lindsay — A. O. Wharton

DIRECTOR GENERAL OF RAILROADS
W. G. McADOO*
913 I. C. C. Bldg., Washington
M. Brice Claggett, Private Secretary to Director General
OSCAR A. PRICE, Assistant to Director General
*Resignation effective Jan. 1

HENRY WALTERS
Advisory
612 I. C. C. Bldg.

THEODORE H. PRICE*, Actuary
1010 I. C. C. Bldg.
Ballard Dunn, Assistant Actuary
Bureau of Suggestions and Complaints
The above and
T. T. Maxey
J. F. Jarrell
E. H. Lamb
Frank F. George
*Resignation effective Jan. 1

WALKER D. HINES, Assistant Director General
909 I. C. C. Bldg.
H. A. Taylor and G. H. Parker, Assistants

Central

vision of Capital Expenditures
603 I. C. C. Bldg.
ROBERT S. LOVETT*, Director
. E. Adams, Engineering Asst.
. W. Sercombe, Accounting Asst.
Resignation effective Jan. 1.

Division of Traffic
1023 I. C. C. Bldg.
EDWARD CHAMBERS, Director
R. C. Wright, Freight
Gerrit Fort, Passenger
E. L. Bevington — W. S. Basinger
C. B. Buxton — C. A. Fox
P. P. Hastings — J. D. Watson
G. F. Randolph — G. W. Kriedler
J. B. Coffey — B. G. Brown

Committee on Mail Transportation
608 Southern Ry. Bldg.
GUY ADAMS, Chairman
Rudolph Brauer
H. L. Fairfield
J. C. McCahan, Jr.
H. T. Mason
G. P. Conard

Agricultural Section
718 18th St.
J. L. EDWARDS, Manager

Interregional Dining Car Committee
J. R. SMART, Chairman

Eastern Freight Traffic Committee
R. CAMPBELL, Chairman
C. C. McCain, Secretary
143 Liberty Street, New York
Southern Freight Traffic Committee
C. McD. DAVIS, Chairman
L. E. Chaloner, Secretary
Walton Building, Atlanta, Ga.
Western Freight Traffic Committee
A. C. JOHNSON, Chairman
E. B. Boyd, Secretary
Transportation Bldg., Chicago

Express and Mail Section
718 18th St.
F. S. HOLBROOK, Manager

Agricultural Committee
North and West
L. SEAGRAVES, Chairman
Chicago
F. W. Welsh — W. L. English
J. B. Lanson — F. S. McCabe
L. J. Bricker — Douglas White

Agricultural Committee
Southeast, Texas, Okla.
W. W. CROXTON, Chairman
Atlanta
G. A. Park — B. L. Hammet
H. J. Schweitert — J. C. Williams
J. C. Welty — T. L. Peeler

Eastern Passenger Traffic Committee
C. M. BURT, Chairman
C. L. Hunter, Secretary
143 Liberty St., New York City
Southern Passenger Traffic Committee
W. J. CRAIG, Chairman
W. H. Howard, Secretary
411 Rhodes Bldg., Atlanta, Ga.
Western Passenger Traffic Committee
P. S. EUSTIS, Chairman
T. Thompson, Secretary
Transportation Bldg., Chicago

Division of Operation
1028 I. C. C. Bldg.
CARL R. GRAY, Director
W. T. Tyler, Senior Asst. Dir.
J. H. Keefe, Asst. Dir., Office
Frank McManamy, Assistant Director, Mech. Dept.
F. C. Wright, Assistant Director Marine Department
Charles A. Morse, Asst. Director Eng. and Maint. Department

Engineering and Maintenance Department
629 So. Ry. Bldg.
In charge of
CHARLES A. MORSE, Assistant Director, Div. of Operation

Maintenance Committee
F. L. Stuart — W. R. Rodenbaugh
E. B. Temple — J. C. Hough
J. E. Crawford — H. R. Safford
E. A. Hadley

Fuel Conservation Section
629 Southern Ry. Bldg., Washington
Union Electric Bldg., St. Louis
EUGENE McAULIFFE, Manager
Major E. C. Schmidt
Assistant to Manager
Robert Collett, Asst. Mgr.
Eastern Region
H. C. Woodbridge, Supervisor
Allegheny Region
Harry Clewer, Supervisor
Pocahontas Region
Bernard J. Feeney, Supervisor
Southern Region
Frank P. Roesch, Supervisor
Northwestern Region
Leslie R. Pyle, Supervisor
Central Western Region
J. W. Hardy, Supervisor
Southwestern Region

Exemption and Deferred Classification Bureau
17th St. and Penn. Ave.
GEORGE M. BUSBY, Manager

Mechanical Department
710 I. C. C. Bldg.
In charge of
FRANK McMANAMY
Assistant Director
Division of Operation
F. P. Pfahler, Chief Mechanical Engineer
J. J. Tatum, General Supervisor of Car Repairs
G. N. DeGuire, General Supervisor of Equipment, East
.....General Supervisor of Equipment, West

Committee on Standards
FRANK McMANAMY, Chairman
Henry Bartlett — H. T. Bentley
J. F. Carroll — C. E. Fuller
F. F. Gaines — A. W. Gibbs
H. L. Ingersoll — J. E. O'Brien
John Purcell — F. P. Pfahler
J. W. Small — J. J. Tatum
W. H. Wilson
E. A. Woodworth, Secretary

Inspection and Test Section
610 Southern Ry. Bldg.
C. B. YOUNG, Manager
Chief Materials Inspector
H. E. Smith
Chief Construction Inspectors
C. T. Markel, Locomotives
J. A. Rickabaugh, Cars

Regional

RNEY, Chairman
Day Plan
mmittee

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ng Committee
IKARD, Chairman
O. Landis

Pocahontas Region
N. D. MAHER, Regional Director
Roanoke, Va.
T. S. Davant, Traffic Assistant
D. E. Spangler, Trans. Asst.
G. W. Jett, Supervisor Tel. & Tel.

Regional Purchasing Committee
E. T. BURNETT, Chairman
B. T. Jellison

J. A. TALBOTT, Chairman
Sailing Day Plan Committee

Southern Region
B. L. WINCHELL, Regional Director
Healy Building, Atlanta, Ga.
J. T. King, Acting Operating Assistant
A. R. Smith, Traffic Assistant
Staff Officers
J. W. Small, Mechanical
J. T. King, Transportation
H. N. Rodenbaugh, Engineering
E. H. Dulaney, Traffic
G. W. Lamb, Accounting
W. L. Stanley, Claims and Claim Prevention
J. A. Jones, Telegraph and Telephone

Regional Purchasing Committee
F. H. FECHTIG, Chairman
Albert C. Mann

W. L. STANLEY, Chairman
Sailing Day Plan Committee

Southern Export Committee
CHARLES T. AIREY, Chairman
Atlanta, Ga.

Northwestern Region
R. H. AISHTON, Regional Director
226 West Jackson Blvd., Chicago
M. J. Gormley, Assistant Regional Director
J. G. Woodworth, Traffic Assistant
E. L. Haugh, Engineering Assistant
E. D. Brigham, Manager, Ore, Coal and Grain Traffic, Duluth, Minn.
J. B. Cook, Supervisor Coal Traffic, Butte, Mont.
Roy W. Morris, Supervisor, Tel. & Tel.

T. M. PROCTOR, Chairman
Sailing Day Plan Committee

Regional Purchasing Committee
L. S. CARROLL, Chairman
F. A. Bushnell

Puget Sound District
L. C. GILMAN, District Director
209 O. W. Passenger Station, Seattle
W. C. Wilkes, Asst. to Dist. Dir.

Supplement to the

Railway Maintenance Engineer

January, 1919

Committee on Health and Medical Relief
17th St. and Pa. Ave.
DR. D. Z. DUNOTT, Chairman
Dr. G. W. Cale, Jr.
Dr. Victor G. Heiser
Dr. T. R. Crowder
Dr. H. M. Bracken

Division of Inland and Coastwise Waterways
601 G St.
G. A. TOMLINSON, Director
H. S. Noble, Federal Manager New York and New Jersey Canals
M. J. Sanders, Federal Manager Mississippi and Warrior Waterways

Car Service Section
718 18th St.
W. C. KENDALL, Manager
E. H. DeGroot, Jr.
A. G. Gutheim
C. B. Phelps
G. F. Richardson
J. A. Somerville
W. J. McGarry
W. L. Barnes, Chicago

Operating Statistics Section
603 Southern Ry. Bldg.
W. J. CUNNINGHAM, Manager
V. P. Turnburke, Assistant Manager
J. J. Ekin
J. G. Drew
G. R. Martin
H. W. Mackenzie
W. C. Wishart

Safety Section
712 Southern Ry. Bldg.
A. F. Duffy, Acting Manager
Regional Supervisors
R. S. Jarnigan, Eastern Roads
Harry J. Bell, Western Roads
C. M. Anderson, Southern Roads
Charles W. Gregg, Washington

Troop Movement Section
429 Homer Building
GEORGE HODGES, Manager

Telegraph Section
Sou. Ry. Bldg.
MARTIN H. CLAPP, Manager

Division of Public Service and Accounting
1114 I. C. C. Building
CHARLES A. PROUTY, Director
George T. Atkins, Traffic Assistant
C. B. Heinemann, Traffic Assistant

Accounting Committee
A. H. PLANT, Chairman
C. B. Seger
R. A. White
J. G. Drew
A. D. McDonald
Frank Nay
L. G. Scott
W. E. Bailey

Auditing Section
718 18th St.
J. W. Roberts, Auditor
Fred Pettijohn, Chief Accountant

Short Line Section
I. C. C. Building
EDWARD C. NILES, Manager
Robert Rantoul, Asst. Mgr.

Division of Labor
606-607 I. C. C. Building
W. S. CARTER, Director
J. A. Franklin, Assistant
G. W. W. Hanger, Assistant
Representatives
William Blackman
John A. Moffitt
Anthony M. Banks
H. H. Reed, Special Asst.

Board of Adjustment No. 1
733 So. Ry. Building
CHARLES P. NEILL, Chairman
L. E. Sheppard, Vice-Chairman
F. A. Burgess
William A. Clark
W. N. Doak
J. W. Higgins
Albert Phillips
John G. Walber
E. T. Whiter

Board of Adjustment No. 2
702 So. Ry. Building
E. F. POTTER, Chairman
George W. Pring, Vice-Chairman
A. C. Adams
G. M. Burgniazet
H. J. Carr
Otto E. Hoard
F. H. Knight
W. S. Murrian
W. H. Penrith
E. A. Sweeley
Robt. J. Turnbull
C. C. VanDornes

Board of Adjustment No. 3
H. A. KENNEDY, Chairman
T. H. Gerrey, Vice-Chairman
S. N. Harrison
F. Hartenstien
E. A. Gould
George E. Kipp
W. A. Titus
Richard P. Dee

Women's Service Section
17th St. and Pa. Ave.
MISS PAULINE GOLDMARK, Manager
Field Agents
Miss Florence E. Clark
Miss Edith R. Hall
Miss Helen Ross
Miss Rose Yates

Southwestern Region
B. F. BUSH, Regional Director
Ry. Exchange Bldg., St. Louis, Mo.
W. G. Vollmer, Assistant Regional Director
E. A. Hadley, Engineering Assistant
W. B. Biddle, Traffic Assistant
G. W. Briece, Supervisor of Transportation
C. H. Wood, Supervisor of Car Service
W. Rogers, Tel. and Tel. Eng.
H. E. Mack, Gen. Supervisor Mail Traffic
H. A. Weaver, Supervisor Coal Traffic, Kansas City
H. K. Mack, Supervisor Coal Traffic, Herrin, Ill.
B. L. Swearingen, Supervisor Oil Traffic, Kansas City
W. A. Hopkins, Supervisor of Stores

Central Western Region
HALE HOLDEN, Regional Director
547 Jackson Boulevard, Chicago
B. B. Greer, Assistant Regional Director
F. E. Clarity, Transportation Assistant
H. A. Scandrett, Traffic Assistant
H. R. Safford, Engineering Assistant
T. E. Paradise, Mechanical Assistant
Richard B. Thornton, Inspector, Tel & Tel.
B. J. Rowe, Supervisor Coal Traffic, Chicago
H. K. Mack, Supervisor Coal Traffic, Herrin, Ill.
Geo. Williams, Supervisor Coal Traffic, Denver
J. D. Kenworthy, Supervisor Coal Traffic Salt Lake City, Utah

Regional Purchasing Committee
C. A. HOW, Chairman
J. L. Cowan

F. M. LUCORE, Chairman Sailing Day Plan Committee

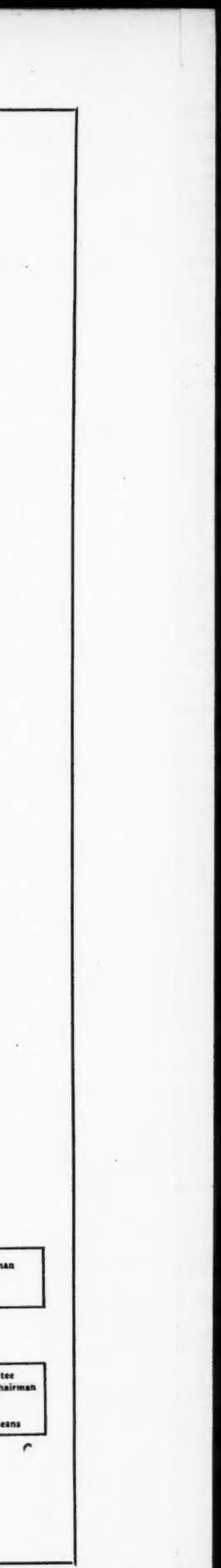
GEORGE MORTON, Chairman Sailing Day Plan Committee

Regional Purchasing Committee
L. N. HOPKINS, Chairman
M. J. Collins
E. A. Clifford, Assistant

Southern Export Committee
CHARLES T. AIREY, Chairman
Atlanta, Ga.
J. W. Daley, Galveston
W. M. Rhett, New Orleans

WILLIAM SPROULE, District Director
San Francisco, Cal.

Texas District
F. G. PETTIBONE, District Director
M. K. & T. Ry. Office Bldg.,
Dallas, Tex.



PERSONAL MENTION

GENERAL

Carl R. Gray, director of operation of the Railroad Administration, on Friday, December 20, announced his resignation, effective January 15.

W. W. Greenland, division engineer of the Western division of the Wabash, with headquarters at Moberly, Mo., has been made superintendent of the Western division, with the same headquarters.

Judge Robert S. Lovett, who has been director of the division of capital expenditures of the Railroad Administration, has resigned, effective January 1. He will return to the Union Pacific, of which he was formerly president, succeeding **C. B. Seger,** who has been president of the corporate organization since Judge Lovett was made director of the division of capital expenditures.

William Allan Mather, who has been appointed general superintendent of the Saskatchewan district of the Canadian Pacific, with headquarters at Moose Jaw, Sask., is an engineer, having graduated from McGill University in 1908. He entered railway service in the construction department of the Canadian Pacific in May, 1903. From January, 1911, to March, 1912, he was resident engineer on that road at Winnipeg. On the latter date he was appointed superintendent at Kenora, Ont., since when he has been in the operating department, more recently as assistant general superintendent of the British Columbia district at Vancouver, a position which he held at the time of his appointment as general superintendent.

Arthur Theodore Mercier, assistant superintendent of the Shasta division of the Southern Pacific, who has been promoted to superintendent, with headquarters at Portland, Ore., received most of his railway training in the engineering department. He was born at New Orleans, La., on December 11, 1881, and graduated from Tulane University in 1903. He entered engineering work in the same year as assistant engineer on the New Orleans Levee Board. In 1904 he was employed by the Southrn Pacific on the Los Angeles division as roadmaster's clerk and transitman, being assigned to work in connection with reconstruction necessitated by the overflow of the Salton sea. From 1906 to 1908 he was general foreman and engineer in charge of terminal construction at San Pedro, Cal., and during 1909 was assistant division engineer on the Los Angeles division. He was then promoted to assistant district engineer of the Southern district and in November, 1912, was appointed division engineer on the San Joaquin division. The following year he was transferred to the Los Angeles division as division engineer, serving in that capacity until February, 1917, when he was made assistant superintendent of the Shasta division, with headquarters at Dunsmuir, Cal. He held that position until his appointment as superintendent.

ENGINEERING

J. L. Campbell, engineer maintenance of way of the El Paso & Southwestern, has been appointed chief engineer, with headquarters at El Paso, Tex.

J. C. Hill has been appointed division engineer on the St. Louis district of the Missouri, Kansas & Texas, with headquarters at Sedalia, Mo., succeeding **B. E. Wilbur,** resigned.

C. G. Delo, chief engineer of the Chicago Great Western, has had his authority extended over the Leavenworth Terminal Railway & Bridge Company, with headquarters at Chicago.

F. M. Graham, division engineer of the Chicago Terminal division of the Pennsylvania Railroad, Western lines, with headquarters at Chicago, has been promoted to supervising engineer at Columbus, Ohio, in place of **R. C. Harris,** appointed general storekeeper, as noted elsewhere. **G. R. Barry,** division engineer at Columbus, has been transferred to the Chicago Terminal division to succeed Mr. Graham. **H. T. Sympson,** assistant division engineer of the Eastern division at Pittsburgh, Pa., succeeds Mr. Barry as division engineer at Columbus.

W. H. Wells, consulting engineer, and **E. M. Durham, Jr.,** chief engineer of construction of the Southern Railroad, have had their authority extended over the Georgia, Southern & Florida, the Hawkinsville & Florida Southern and the St. Johns River Terminal.

Wynne Ivan Jeffords, assistant chief draftsman of the Erie at New York, has been appointed resident engineer at Meadville, Pa., in charge of the construction of engine terminal facilities at that point. Mr. Jeffords was born at Randolph, N. Y., August 25, 1886, and received his education in the Stevens Institute of Technology and New York University. He first entered railway service in March, 1906, as rodman with the Erie. He was granted a leave of absence in March, 1907, and re-entered the service in October, 1911, as levelman at Cambridge Springs, Pa. He subsequently served as transitman at the same point. In June, 1912, he went to the Boston & Albany as concrete and steel inspector at Boston, Mass., returning to the Erie in September, 1913, as assistant estimator. Subsequently he served with the Erie as assistant engineer and assistant chief draftsman before receiving his recent appointment, as noted above.

J. L. Haugh, engineer of capital expenditures in the office of the Northwestern regional director at Chicago, who has been appointed engineering assistant to the Northwestern regional director, with the same headquarters, as noted in the December issue, was born in 1887. He took a two-year course in special engineering work at the University of Michigan and one year at the University of Wisconsin. Mr. Haugh commenced railway work with the Chicago & North Western in 1905 as a draftsman on maintenance work. The following year he was employed on construction work on the Manitowoc, Green Bay & Northwestern, and the next two years he was successively topographer on railway location and instrumentman on maintenance for the North Western. He was locating engineer on the Milwaukee, Sparta & Northwestern, and the following two years was assistant to the engineer in charge of the construction of the St. Louis, Peoria & Northwestern from Peoria, Ill., to Girard. Later for six months he was engineer on heavy grade reduction between Manlius, Ill., and Radnor on the Chicago & North Western. Following this for 2½ years he was assistant engineer on valuation work and then became assistant to the chief engineer. One year later he became engineer of capital expenditures in the office of the Northwestern regional director.

J. L. Haugh

Barton Wheelwright, acting signal engineer of the Grand Trunk, with headquarters at Montreal, Que., has been appointed engineer maintenance of way of the Grand Trunk lines in New England, with headquarters at Portland, Me. He was born at Minneapolis, Minn., on March 12, 1888, and graduated from Harvard University in 1910, receiving a higher degree in 1911. Mr. Wheelwright entered railway service with the Grand Trunk the same year as a draftsman at Toronto, Ont. In May, 1912, he was promoted to block signal

inspector at Valparaiso, Ind., and became signal inspector in April, 1913, with headquarters at Montreal, Que. Two years later Mr. Wheelwright was promoted to the position of assistant signal engineer with the same headquarters and in January, 1917, he was appointed acting signal engineer, which position he held until his appointment to the position of engineer maintenance of way.

Major F. L. C. Bond, formerly division engineer on the Grand Trunk, has been appointed chief engineer of the Grand Trunk Railway System, with headquarters at Montreal, Que., succeeding H. R. Safford, resigned to become engineer of the Central Western region, United States Railroad Administration. Major Bond has just returned from overseas, after two years service with the Tenth Battalion, Canadian Railway Troops. He was born on February 21, 1877, at Montreal, Que., and was educated in the high school of his native town and at Collegiate Institute and McGill University. In 1898 he entered the service of the Grand Trunk as resident engineer on the Eastern division, and in 1901 was appointed engineer in charge of double track construction. The following year he was appointed night superintendent on the construction of the Park avenue tunnel of the New York subway and subsequently returned to the service of the Grand Trunk as resident engineer, Eastern division, remaining in that position until 1913. He then served as division engineer, Eastern lines, until 1916, when he went overseas with the Canadian Expeditionary Forces, and now becomes chief engineer of the Grand Trunk, as above noted.

Major F. L. C. Bond

Charles N. Bainbridge, assistant engineer with the Chicago, Milwaukee & St. Paul, has been appointed engineer of design, with headquarters at Chicago, Ill. He was born on March 29, 1887, at Philadelphia, Pa., and graduated from Pennsylvania State College in 1907, receiving a higher degree in 1910. He entered railway service with the Chicago, Milwaukee & St. Paul in June, 1909. In September of the same year he became an instructor in civil engineering in the Pennsylvania State College, but in October he returned to the St. Paul as a designer and detailer of steel and reinforced concrete structures, spending considerable time on estimates and studies for grade separation work. From November, 1911, to March, 1912, he was a designer of steel railway bridges in the bridge department of the Baltimore & Ohio and from the latter date to the present time he has been connected with the engineering department of the Chicago, Milwaukee & St. Paul consecutively as squad foreman on structural design work, office engineer and recently as assistant engineer in charge of the erection and maintenance of steel and timber bridges.

Charles N. Bainbridge

Walt Dennis, who was formerly principal assistant engineer on the Wabash, with headquarters at St. Louis, Mo., and who more recently has been engaged on government work, with headquarters at Richmond, Va., has been appointed division engineer of the Western division of the Wabash, with headquarters at Moberly, Mo., succeeding **W. W. Greenland,** promoted, as noted elsewhere. A sketch of Mr. Dennis' railway career appeared in the *Railway Maintenance Engineer* for May, 1917, page 166.

TRACK

B. E. Marburger has been appointed general foreman under the supervision of the engineer maintenance of way of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan.

C. Francis has been appointed roadmaster of the Newport and Orford subdivisions of the Canadian Pacific, with headquarters at Farnham, Que., succeeding **R. H. Milliken,** transferred.

T. F. Donahue, general supervisor of road on the Baltimore & Ohio, eastern lines, with office at Pittsburgh, Pa., has been appointed roadmaster in charge of maintenance of way and structures, with headquarters at Keyser, W. Va.

PURCHASING AND STORES

R. B. Pegram, general purchasing agent of the Southern Railroad, has had his authority extended over the Georgia, Southern & Florida, the Hawkinsville & Florida Southern and the St. Johns River Terminal.

E. Langham, general purchasing agent of the Canadian Northern, has had his jurisdiction extended to include all the Canadian Government Lines, with headquarters in Toronto, Ont.

E. A. Clifford, assistant general purchasing agent of the Atchison, Topeka & Santa Fe, has been appointed assistant to the Regional Purchasing Committee for the Central Western region, with headquarters at Chicago.

J. A. Turner, purchasing agent of the Mobile & Ohio at Mobile, Ala., has had his authority extended to include the Gulf, Mobile & Northern. **H. G. Reiser,** purchasing agent and superintendent of telegraph of the Gulf, Mobile & Northern, with headquarters at Mobile, has been appointed assistant purchasing agent.

F. G. Prest, purchasing agent of the Northern Pacific, with headquarters at St. Paul, Minn., will have charge of both the purchasing and stores departments of the Northern Pacific, the Minnesota & International, the Big Fork & International Falls and the Camas Prairie, and will appoint a general storekeeper and other necessary assistants reporting to him direct.

R. C. Harris, supervising engineer of the Pennsylvania Lines, Southwest System, has been appointed general storekeeper of the Pennsylvania Lines West of Pittsburgh, with headquarters at Pittsburgh, Pa. He was born on May 8, 1874, at Richmond, Ind., and is a graduate of Purdue University. Mr. Harris entered railway service in July, 1897, with the Pennsylvania Lines as a rodman on the Richmond division. Subsequently he held the positions of assistant on engineering corps, assistant engineer and division engineer on various divisions. On January 1, 1913, he was promoted to supervising engineer with headquarters at Columbus, Ohio, which position he held until his recent appointment.

OBITUARY

Charles John Augustus Morris, of the firm of Morris, Shepard & Dougherty, railroad contractors, at St. Paul, Minn., died in that city on October 27, aged 68 years. Mr. Morris was chief engineer of the St. Paul & Duluth, now a part of the Northern Pacific, from May, 1898, to 1900. He began engineering work with the St. Paul & Pacific on the location and construction of that line from Barnesville, Minn., to St. Vincent in 1871 and was employed on the construction of the railroad bridge over the Mississippi river at St. Cloud, Minn., in the same year.

CONSTRUCTION NEWS

The Canadian Northern has asked for bids for the construction of two concrete abutments at the crossing of the Little Madawaska river, at mile 147.4, Pembroke subdivision, about 67 miles west of Pembroke, Ont. Bids were also requested for the removal of the present sub-structure and the construction of seven concrete piers at the Trent river crossing, mile 43.5, Maynooth subdivision, at Glen Ross, 13 miles north of Trenton, Ont.

The Cisco & Northwestern is the name of a company incorporated with a capital stock of $500,000 to build a railroad between Cisco, Tex., and Graham, 70 miles.

The Colorado & Southern has awarded a contract to Fairbanks, Morse & Co., Chicago, for the construction of a 300-ton capacity bucket-conveyor type coaling station at Denver, Colo. Coal will be delivered to engines on two tracks and the plant will be operated by a 15-hp. oil engine, Fairbanks, Morse type Y. The enginehouse will be constructed of concrete and the station will have a concrete foundation and a wooden superstructure.

The Illinois Central is asking for bids on a filtration plant at Baton Rouge, La., to cost from $15,000 to $20,000. The plant will have a capacity of 25,000 gal. per hr. and will be equipped with two horizontal pressure filters and a subsidence tank. It will also be equipped with the chlorinating outfit to sterilize the water for drinking purposes.

This road awarded the contract for a combination freight and passenger station at Dawson Springs, Ky., to T. S. Leake & Co., Chicago. (See last month's issue, p. 432.)

The Pennsylvania Railroad—Western Lines—has awarded a contract to the C. R. Cummins Company, Cleveland, Ohio, for the improvements which the Pennsylvania is making at Columbus. The work consists of extending the eastward and westward classification yards, and the building of a new stock yard; increasing the engine house layout; the extension of the stone yard, and additional improvements to the shops. The work will necessitate the rebuilding of the Cleveland avenue bridge spanning the yard tracks, which will be a concrete structure extending over about 18 tracks.

At Yellow Creek, Ohio, the Cummins company is also building for the Pennsylvania a running track between Yellow Creek and Hammondsville, and later a new "Y" will be constructed. At Terre Haute, Ind., the Cummins company is also building an east classification yard, the construction of which will shortly be closed for this season and again resumed next spring.

SALARIES OF RAILROAD ENGINEERS

The Engineering Council, New York City, representing the American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, and the American Institute of Mining Engineers, wrote recently to the director general of railroads calling attention to the grievances of many engineers on account of the failure of the Railroad Administration to give them sufficient consideration in the fixing of compensation. It was requested that all technical engineers be given suitable separate classification with rates of compensation in accord with their duties and the expense to which they have been put for their education. The letter, signed by A. D. Flinn, secretary of the Engineering Council, asked early action on its request, in behalf of 35,000 members of the different branches of the profession. In a reply dated December 4, signed by G. H. Sines, chairman of one of the wage boards, the Administration says that where the complainants are not taken care of by supplements No. 7 and No. 8, to general order No. 27, their cases should receive special treatment at the hands of the federal managers. Men in the service of the railroads not satisfied with this action are recommended to take their cases up with the Division of Labor, in accordance with the provisions of Circular No. 3.

SUPPLY TRADE NEWS

Joseph T. Ryerson & Son, Chicago, announce the opening of an office in Philadelphia, located in the Widener building.

B. B. Ayers, advertising manager of the American Steel & Wire Company, has transferred his headquarters from Chicago to 30 Church street, New York.

L. C. Sprague, district manager of sales of the Chicago Pneumatic Tool Company at New York, has been appointed assistant secretary, with headquarters at 52 Vanderbilt avenue in that city.

John Sterling Deans, vice-president and consulting engineer for the Phœnix Bridge Company, and for many years a well-known figure in the field of bridge engineering, died on Monday, December 12.

Joseph Meyerson has been appointed secretary to the president of the Walter A. Zelnicker Supply Company, St. Louis. Mr. Myerson was associated for 10 years with the Southwestern Tariff Bureau, latterly as secretary to F. A. Leland.

The American Manganese Steel Company, San Francisco, Cal., is building a new plant at Oakland, which will be of steel construction, 240 ft. by 180 ft., with an 80-ft. crane span and 50-ft. side bays. H. P. Hoyt & Co., San Francisco, has the contract for the new plant and the cost of the main building without equipment is estimated at $100,000.

The Q. & C. Company of Canada, Ltd., has been incorporated, with Charles F. Quincy, president, and Frank F. Kister, secretary-treasurer. This company will manufacture and sell in Canada the railway devices controlled by the Q. & C. Company. The Canadian representatives will be the General Supply Company of Canada, Ltd., Ottawa.

William M. Kinney, inspecting engineer and engineer of the promotion bureau of the Universal Portland Cement Company, Chicago, has been appointed general manager of the Portland Cement Association, succeeding **H. E. Hilts,** resigned. For over 11 years Mr. Kinney has been engaged in cement and concrete promotion work, having occupied the positions of engineer, promotion bureau and inspecting engineer of the Universal Portland Cement Company for the past four years. He was born in 1885 and is a graduate of the Lewis Institute, Chicago. In 1906 he entered the employ of the Willamette Iron & Steel Works, Portland, Ore., as a draftsman, and was later employed by the Universal Portland Cement Company in the inspecting bureau. From 1908 to 1914 he was assistant inspecting engineer for the company at Pittsburgh, later becoming inspecting engineer and engineer of the information bureau of the company.

William M. Kinney

The Independent Pneumatic Tool Company announces the opening of a branch office and service station in Cleveland, Ohio, on December 15. A complete line of Thor pneumatic and electric tools and repair parts will be carried in stock at 1103 Citizens building, under the management of Hayden F. White, who has represented the company in Detroit, Chicago and Milwaukee districts for some years past.

The Brown Hoisting Machinery Company announces the following changes in its organization: Harvey H. Brown, chairman of the board of directors; Alexander C. Brown,

president; Melvin Pattison, vice-president, general manager and director; Robert G. Clapp, director; John F. Price, director; Ewen C. Pierce, general manager of sales.

J. H. Libberton, division engineer of the Universal Portland Cement Company, with headquarters at Chicago, has been promoted to the position of engineer of the promotion bureau for that company, succeeding **W. M. Kinney,** who has been appointed general manager of the Portland Cement Association, as noted elsewhere in these columns.

L. F. Body has been appointed manager of railway, street railway and marine sales of the Glidden Company, Cleveland, effective December 1. For many years Mr. Body has been identified with paint and varnish interests. He began his career with the Sherwin-Williams Company in 1902, advancing to the position of manager of railway and marine sales in 1912. In 1915 he left the Sherwin-Williams Company to become sales manager of the Master Builders' Company, Cleveland.

Lieut. Clarence E. Holborn, who was instantly killed in an airplane accident at Call Field, Wichita Falls, Texas, on December 3, was employed, before entering military service, in the advertising department of the Hyatt Roller Bearing Company, New York. Previously he was in the service of the Simmons-Boardman Publishing company, publishers of the *Railway Maintenance Engineer,* being employed for a number of years in various capacities with the business and advertising departments.

J. Q. Barlow, late head of the department of maintenance (including betterments and improvements) of the Southern Pacific Company, announces the opening of a consulting engineer's office at 822 Phelan building, San Francisco, Cal. Mr. Barlow was formerly associated with the Northern Pacific as assistant engineer for four years; the Union Pacific as division engineer for eight years; for six years he served as chief engineer in various railway irrigation and power enterprises. He was also chief engineer for six years on the Western Maryland, and served as assistant chief engineer and chief of the maintenance department of the Southern Pacific, as above noted, for ten years.

RECEPTION IN HONOR OF CAPTAIN HUNT

Captain Robert Woolston Hunt, for many years a well-known figure in the steel industry, and president of Robert W. Hunt & Co., a bureau of inspection, tests and consultation, was tendered a reception in honor of his eightieth birthday, on Monday, December 9, at Mid-Day Club, Chicago. Fully 500 friends, associates and business acquaintances attended. On Monday evening members of his staff and intimate associates joined Captain Hunt in a dinner at the Blackstone Hotel. This was the occasion for the presentation of a memorial by the Board of Direction of the American Institute of Mining Engineers, congratulating him "upon his notable achievements as a pioneer in the manufacture of iron and steel and his long and admirable service both as a practical director and as a wise critic and counselor in that art."

Captain Robert Woolston Hunt

Capt. Hunt was born December 9, 1838, in Fallsington, Buck County, Pa. He spent several years learning the practical side of iron making in the rolling mills of John Burnish & Co., Pottsville, Pa., and later took a course in analytical chemistry in the laboratory of Booth, Garrett & Blair, upon the completion of which he entered the employ of the Cambria Iron Company, Johnstown, Pa., where, on August 1, 1860, he established the first laboratory in America as a direct part of an iron or steel organization.

In the fall of 1861 he entered the U. S. military service, and upon being mustered out in 1864 he was employed in the experimental Bessemer works of the Cambria Iron Company at Wyandotte, Mich., being placed in charge of those works in July, 1865, and so continued until May, 1866, when the Cambria Iron Company called him back to Johnstown to take charge of their steel business.

Later he assisted George Fritz, Cambria's chief engineer, in designing and building its Bessemer works and assumed charge of it on its completion July 10, 1871. On September 1, 1873, he became superintendent of the Bessemer works of John A. Griswold & Co., Troy, N. Y., and in March, 1875, general superintendent of the Albany & Rensselaer Iron & Steel Company. In April, 1888, he established the bureau of inspection, tests and consultation of Robert W. Hunt & Co. at Chicago.

TRADE PUBLICATIONS

Discount Guide.—George B. Carpenter & Co., Chicago, has issued a 66-page discount guide to catalogue No. 110, dated September, 1918. This constitutes the complete statement of discounts and price revisions. It is tabulated by page numbers of the general catalogue and covers the complete line of railroad and construction equipment handled by that company.

Standard Wooden Buildings.—The Austin Company, Cleveland, Ohio, has issued an eight-page circular, introducing the standardized wooden buildings built by that company to afford the same areas, framing arrangements and other features provided in the Austin standard structural steel buildings. The new standards involve the use of wooden columns and roof purlins with Austin lattice trusses. The smaller standards can be completed within 30 days and the larger ones in 60 days.

Welding and Cutting Apparatus.—The Bastian-Blessing Company, Chicago, has issued a 26-page catalog illustrating complete units of Rego welding and cutting apparatus, and giving complete descriptions of the cutting and welding torch details and the Rego diaphragm regulator details. The company's line of oxygen, acetylene and hydrogen welding regulators and adapters is also illustrated.

Coal Gates.—Catalogue No. 37 of the Beaumont Manufacturing Company, Philadelphia, Pa., illustrates and describes the Beaumont standard types of gates for controlling the flow of coal, ashes, coke, etc., from bins and pockets. The purpose of the catalogue is to present the results of the company's experience in designing and installing gates for varied purposes, and the types illustrated in the catalogue have been adopted as standard.

Erie Ditchers.—Under the title, "What the Erie Ditcher Is Doing for the Pennsylvania," the Ball Engine Company, Erie, Pa., has issued a 12-page illustrated booklet, describing the variety of uses of this ditcher on different divisions of the Pennsylvania Railroad, including its use in ditching, coaling locomotives, removing slides and handling cinders. The booklet is attractively prepared and contains much information of interest to roadway and operating officers.

Iron and Steel Products.—A new edition of the Interstate Blue Book has been published by the Interstate Iron & Steel Company, Chicago. This book contains 204 pages and gives complete information regarding all Interstate products. Bars, bands, angles, channels, tees, flats and special shapes are shown with sizes listed for both wrought iron and high or low carbon steel, and the many other products of the company, including wire and wire products, staples and rivets are fully illustrated and described. The book contains the National Iron & Standard Steel classifications of price extras, as well as a number of weights and gages and other valuable information conveniently arranged for ready reference. The alloy and special analysis steels from the South Chicago plant are also described.